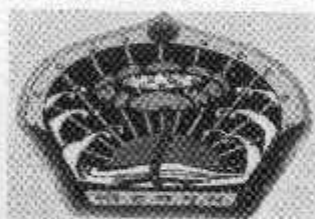


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SCIENCE FOR WOMEN (AUTONOMOUS),
JABALPUR (M.P.)**

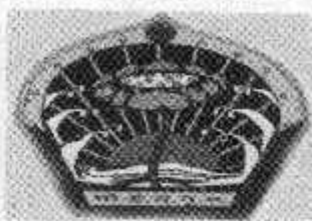
**UG SYLLABUS
SESSION 2023-2024**



COMPUTER SCIENCE

Department of Mathematics & Computers

COMPUTER SCIENCE



B.sc I Year

PAPER	TITLE	CREDIT
Major Paper - I	Computer System Architecture	Th - 4 credit, pra. - 2 credit
Paper – II / Minor / Elective	Programming Methodologies & Data Structure	Th - 4 credit, pra. - 2 credit

B.sc II Year

PAPER	TITLE	CREDIT
Major Paper - I	Computer Networks & Information Security	Th - 4 credit, pra. - 2 credit
Paper – II / Minor / Elective	Oriented Programming with Java	Th - 4 credit, pra. - 2 credit

B.sc III Year

PAPER	TITLE	CREDIT
Group A Paper - I	Operating System	Th - 4 credit, pra. - 2 credit
Group A Paper - II	Programming with Python	Th - 4 credit, pra. - 2 credit
Group B Paper - I	PHP & MySQL	Th - 4 credit, pra. - 2 credit
Group B Paper - II	Cloud Computing	Th - 4 credit, pra. - 2 credit
Minor	Programming with Python	Th - 4 credit, pra. - 2 credit

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Department of Mathematics

Session 2023 - 2024

B.Sc. I Year

Course Code S1-COSC1T (Paper- I)

Subject: Computer Science

Course Title : Computer System Architecture

PART B: Content of the Course

(No of Lecture (in hours per week): 2 Hrs. per week

Total No of Lecture : 60 Hrs.

Module	Topics	No. of Lectures
I	Fundamentals of Digital Electronics: Data Types, Complements, Fixed-point Representation, Floating-point Representation, Binary and other Codes, Error Detection Codes. Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Sequential Circuits, simple combinational circuit design problems. Circuits -Adder- Subtractor, Multiplexer, Demultiplexer, Decoders, Encoders Flip - Flops, Registers, Counters.	10
II	Basic Computer Organization : Instruction codes ,Computer Registers, Computer Instructions, Timing & Control, Instruction Cycles, Memory Reference Instruction, Input - Output & Interrupts, Complete Computer Description & Design of Basic Computer . Instructions - Instruction formats, Addressing modes, Instruction codes , Machine language, Assembly language. Register Transfer and Micro Operations - Register Transfer language, Register Transfer Bus & Memory Bus & Memory, Transfer Arithmetic Micro-Operation, Logic Micro -Operations, Shift Micro -Operation.	20
III	Processor and Control Unit- Hardwired vs. Micro programmed Control Unit, General Register Organization, Stack Organization, Instruction Format, Data Transfer & Manipulation, Program Control, Introductory concept of RISC, CISC, Advantages and disadvantages of both. Pipelining - concept of pipelining, introduction to Pipelined data path and control - Handling Data hazards & Control hazards.	10
IV	Memory and I/O Systems - Peripheral Devices, I/O Interface, Data Transfer Schemes -Program Control Interrupt, DMA Transfer.I/O Processor. Memory Hierarchy, Processor vs. Memory Speed, High- Speed Memories , Main memory, Auxiliary memory, Cache Memory, Associative Memory, Interleaving, Virtual Memory, Memory Management,	10

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Course Code S1-COSC1T (Paper- I)

Subject: Computer Science

Course Title : Computer System Architecture

V	<p>Parallelism - meaning, types of parallelism, introduction to Instruction- level - parallelism, parallel processing challenges, Applications.</p> <p>Flynn's classification - Introduction to SISD, SIMD, MISD, MIMD Hardware multithreading -Introduction, types, advantages and applications.</p> <p>Hardware Multithreading- Introduction, Types ,Advantages and Applications</p> <p>Multicore processors-Introduction, advantages, difference from multiprocessor.</p> <p>Indian contribution to the field - Contributions of reputed scientists of India origin- like - Dr. Vinod Dham - Father of Intel Pentium Processor, Dr. Ajay Bhat - Co Inventor of USB Technology, Dr. Vinod Khosla co-founder of Sun Microsystems, Dr.-Vijay P Bhatkar - architect of India's national initiative in supercomputing, and many others,</p> <p>Parallel Computing projects of India-PARAM, ANUPAM, FLOSOLVER, CHIPPS etc. Other relevant contributors and contributions</p>	10
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Keywords /Tags : Digital Electronics, Logic Gates, Circuits, Instruction formats, Addressing Modes, parallelism, pipelining , Memory Hierarchy Multicore, Multithreading, SISD, SIMD, MISD, MIMD, PARAM, ANUPAM, FLOSOLVER, CHIPPS.

Part C: Learning Resources

Textbooks, Reference Books, other Resources

Suggested Readings:

- M.Morris Mano, "Computer System Architecture ",PHI.
- Heuring Jordan , "Computer System Design & Architecure
- William Stalling " Computer Organization & Architecture", Person Eduction Aisa,
- V.Carl Hamacher "Computer Organization ",TMH
- Tannenbaum, "Structured Compter Organization,"PHI.

Suggestive digital platform web links:

<https://www.youtube.com/watch?v=4TzMyXmzL8M>

<https://nptel.ac.in/course/106/106/106106166/>

<https://nptel.ac.in/course/106/106/106106134/>

Suggested equivalent online courses

<https://nptel.ac.in/course/106/105/106105163/>

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Session 2023 - 2024 B.Sc. I Year

Course Code S1-COSC1T (Paper- I)


Subject: Computer Science


Course Title : Computer System Architecture

PART B: Content of the Course		
No. of Lab. Practicals (in hours per week): 2 Hrs. per week		
Total No. of Labs: 30 Hrs.		
	Suggestive list of Practicals	No. of Labs.
	<ol style="list-style-type: none">1. To study basic gates (AND, OR, NOT) and verify their truth tables.2. To convert a given binary number to Gray code using IC 7486.3. To study and verify NAND as Universal gate using IC 7400.4. To study half adder using basic gates and verify its truth table.5. To study Full Adder using basic gates and verify its truth table.6. To realize basic gates (AND, OR, NOT) from Universal gates (NAND and NOR).7. To verify truth table of 4-bit adder IC 7483.8. To design and construct RS flip Flop using gates and verify the truth table.9. To design and construct JK flip Flop using gates and verify the truth table.10. To verify DeMorgan's Theorem.	

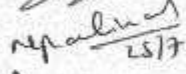
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Dr. Shailja Shukla 

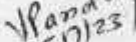
Dr. Geeta Shrivastava 
25.07.23


Dr. Nisha Paliwal 
25/7

Dr. Sameer Shrivastava 


Dr. Vijay Khare

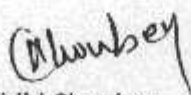
Dr. Anuj Hundet 

Dr. Vimmy Pandey 
25/7/23

Dr. Sudipta Sanyal 
25/7

Dr. Ashok Verma

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Department of Mathematics

Session 2023 - 2024

B.Sc. I Year

Course Code S1-COSC2T (Paper-II)

Subject: Computer Science

Course Title : Programming Methodologies & Data Structure

PART B: Content of the Course

(No of Lecture (in hours per week): 2 Hrs. per week

Total No of Lecture : 60 Hrs.

Credit :- 04

Module	Topics	No. of Lectures
I	<p>Introduction to Programming - Program Concept, Characteristics of Programming. Stages in Program Development. Algorithms, Notations. Design. Flowcharts, Types of Programming Methodologies</p> <p>Introduction to C++ Programming -Basic Program Structure In C++, Data Types. Variables, Constants, Operators and Basic I/O</p> <p>Variables -Declaring. Defining and Initializing Variables.Scope of Variables, Using Named Constants. Keywords. Casting of Data Types Operators (Arithmetic, Logical and Bitwise). Using Comments in programs, Character I/O (getc, getchar, putc, putchar etc.). Formatted and Console I/O (printf(), scanf(), cin, cout), Using Basic Header Files (stdio.h, iostream.h, conio.h etc.)</p> <p>Simple Expressions in C++ (including Unary Operator Expressions. Binary Operator Expressions). Understanding Operators Precedence in Expressions</p> <p>Conditional Statements if construct, switch-case construct.</p> <p>Iterative Statements while, do- while, and for loops. Use of break and continue in Loops. Using Nested Statements (Conditional as well as Iterative)</p>	10
II	<p>Functions Top Down Design, Pre-defined Functions, Programmer — defined Functions. Local Variables and Global variables, Functions with Default Arguments. Call-By-Value and Call-By-Reference Parameters. Recursion.</p> <p>Introduction to Arrays - Declaration and Referring Arrays. Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi-Dimensional Arrays.</p> <p>Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures.</p> <p>Unions - Declaration and Initialization.</p> <p>Strings - Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions.</p> <p>Searching Algorithms - Linear Search. Binary Search.</p> <p>File Handling - Use of files for data input and output, merging and copying files.</p>	16

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Course Code S1-COSC2T (Paper-II)

Subject: Computer Science

Course Title : Programming Methodologies & Data Structure

III	Data Structure - Basic concepts, Linear and Non-Linear data structures Algorithm Specification - Introduction, Recursive algorithms, Data Abstraction, Performance Analysis. Linked List - Singly Linked Lists, Operations, Concatenating, circularly linked lists-Operations. For Circularly linked lists, Doubly Linked Lists - Operations. Array - Representation of single, two dimensional arrays, sparse matrices- array and linked representations. Stack - Operations, Array and Linked Implementations, Applications-Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation.	12
IV	Queue - Definition, Operations, Array and Linked Implementations. Circular Queue- Insertion and Deletion Operations, Dequeue (Double Ended Queue), Priority Queue- Implementation. Trees - Representation of Trees, Binary tree, Properties of Binary Trees Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals ,Threaded Binary Trees. Search Trees - Binary Search Trees, AVL Trees Definition and Examples.	10
V	Heap - Definition, Insertion, Deletion. Graphs - Graph ADT, Graph Representations, Graph Traversals, Searching. Hashing - Introduction, Hash tables, Hash Functions, Overflow Handling Sorting Methods , Comparison of Sorting Methods, Indian Contribution to the field : Innovations in India, origin of Julia Programming Language, Indian Engineers who designed new . Programming languages, open source languages, Dr. Sartaj Sahni- computer scientist – pioneer of data structures Other relevant contributors and contributions	12
Keywords/Tags: Programming C++,Data Structures, Expressions, Control File Handling Arrays Stack, Queue, Linked List Tree Graph, Structure, Union Hash, Search, Sort Algorithm		

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Department of Mathematics

Session 2023 - 2024

B.Sc. I Year

Course Code S1-COSC2T (Paper-II)

Subject: Computer Science

Course Title : Programming Methodologies & Data Structure

Part C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings:

- Lipschutz: Schaum's outline series Data structures, Tata McGraw-Hill
- Problem Solving and Program Design in C, J.R.Han;u and E.B.Koffman, Pearson, 2015
- E.Balguruswamy, "C++ "TMH Publication ISBN 0-07-462038-X
- Herbertz Shield, "C++ The Complete Reference "TMH Publication ISBN 0-07-463880-7
- R.Lafore, 'Object Oriented Programming C++'
- N.Dale and C. Weems, Programming and problem solving with C++ : brief edition , Jones & Bartlett Learning.
- Adam Drozdek, "Data Structures and algorithm in C++ ", Third Edition ,Cengage Learning .
- Sartaj Sahani, Data Structure and Program, Design in C++, Pearson.
- D.S malik Data ,Data Structure using C++, Second edition, Cengage Learning.
- M.A.Weiss, Data structure and Algorithm Analysis in C, 2nd edition, Pearson.

Suggestive digital Platform web links:

<https://www.youtube.com/watch?v=BCIS40yzssA>

<https://www.youtube.com/watch?v=vLnPwxZdW4Y&vl=en>

<https://www.youtube.com/watch?v=Umm1ZQ5ltZw>

https://www.youtube.com/watch?v=AT141CXuMKI&list=PLdo5W4Nhv31bbKJzrsKfMpo_gruLl8LU

Suggested equivalent online courses

<https://nptel.ac.in/courses/106/105/106105151/>

<https://nptel.ac.in/courses/106/106/106106133/>

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Department of Mathematics

Session 2023 – 2024

B.Sc. I Year

Course Code S1-COSC2T (Paper-II)

Subject: Computer Science

Course Title : Programming Methodologies & Data Structure

PART B: Content of the Course		
No. of Lab Practicals (in hours per week): 2 Hrs per week		
Total No. of Lab: 30 Hrs		
Max. Marks: 25+75		Min. Passing Marks: 33
Suggestive list of Practicals	No. of Labs.	
<p>II Given the problems statements, students are required to formulate problem, develop flowchart/algorithm, write code in C++, execute and test it. Students should be given assignments on following:</p> <ol style="list-style-type: none"> a. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures b. Learn how to use functions and parameter passing in functions, writing recursive programs. Write a program to swap the contents of two variables. Write a program for finding the roots of a Quadratic Equation. Write a program to find area of a circle, rectangle, square using switch case. Write a program to check whether a given numbers is even or odd. Write a program to print table of any number. Write a program to print Fibonacci series. Write a program to find factorial of a given number. Write a program to convert decimal (integer) number into equivalent binary number. Write a program to check given string is palindrome or not. Write a program to perform multiplication of two matrices. Write a program to print digits of entered number in reverse order. Write a program to print sum of two matrices. Write a program to print multiplication of two matrices. Write a program to generate even/odd series from 1 to 100. Write a program whether a given number is prime or not. Write a program for call by value and call by references. Write a program to generate a series $1+1/1!+2/2!+3/3!+-----+n/n!$ 	30 Hrs	

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Subject: Computer Science

Course Title : Programming Methodologies & Data Structure

19. Write a program to create a pyramid structure * ** *** ****	
20. Write a program to create a pyramid structure 1 12 123 1234	
21. Write a program to check entered number is Armstrong or not.	
22. Write a program for traversing an Array.	
23. Write a program to input N numbers, add them and find average.	
24. Write a program to find largest element from an array.	
25. Write a program for Linear search.	
26. Write a program for Binary search.	
27. Write a program for Bubble sort.	
28. Write a program for Selection sort.	

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Department of Mathematics

Session 2023 - 2024

B.Sc. II Year

Course Code – SZCOS1T (Major – I)

Subject: Computer Science

Course Title : Computer Networks & Information Security

PART B: Content of the Course		
(No of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures (in hours) : 60 Hrs.		Credit :- 04
Module	Topics	No. of Lectures
I	Introduction to Computer Network : Use of computer network : Access to information, person to person communication, electronic commerce, internet of thing; Types of computer network : Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network. Network Technology : Personal Area Network, Local Area Network, Metropolitan Area Network, Wide Area Network, internetworks, example of network (Internet, Mobile network, wireless network – Wi-Fi); Reference Model; OSI, TCP/IP, Critique of the OSI and TCP/IP reference models; Policy, Legal & Social Issues : Online speech, net neutrality, security & privacy, disinformation. Keywords : IoT, Broadband, LAN, MAN, WAN, OSI, TCP/IP.	8
II	Physical Layer : Guided Transmission Media : Twisted pairs, coaxial cable , Fiber Optics; Wireless Transmission : The electromagnetic spectrum, frequency hopping spread spectrum, direct sequence, spread spectrum, ultra – wideband communication; Cellular Network: Common concept – Cells, handoff, paging; 1G, 2G, 3G, 4G & 5G technology. Keywords : Coaxial cable, fiber optics, 2G, 3G, 4G, 5G.	8
III	Data Link Layer: Service Provided to Network Layer: Data Link Control: Framing, Flow and Error Control; Error detecting codes, Error correcting codes; Data Link Protocols : Basic transmission and receipt, simplex link layer protocol, Full duplex, Sliding window protocol, Packet over SONET, ADSL, Point – to – Point Protocol.	12

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Subject: Computer Science
Course Title : Computer Networks & Information Security

	<p>Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, Virtual - Circuit Networks, and Structure of a Switch.</p> <p>Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge and Gateway (Fundamental concepts).</p> <p>Keywords: error correcting codes, error detecting codes, SONET, ADSL, point – to – point protocol, Router, Modem, Repeater, Hub, Switch, Bridge, Gateways.</p>	
IV	<p>Network Layer: Network Layer Issues, Routing Algorithm: Optimality, principle of shortest path algorithm, Flooding, Distance Vector Routing, Broadcast Routing; congestion in network, traffic management approaches; IP Address, IPv4 Addresses, IPv6 Addresses, Virtual – Circuit Network : Frame Relay and ATM, Transport layers : Process – Process Delivery: UDP, TCP. Application layers: DNS, SMTP, POP, ftp, http and https. Basics of Wi-Fi (Fundamental concepts only). Streaming audio and video : digital audio and video, streaming stored media, real-time streaming. Keywords : routing algorithm, IPv4, IPv6, ATM, SMTP, POP, ftp, http, https, WiFi, video streaming.</p>	12
V	<p>Network Security and Information Security : Fundamentals of network and information security: principles of security and attack. Security Goals (Confidentiality, Integrity, and Availability), Non-Repudiation. Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability. Vulnerability and Threats: Phishing Attacks, E-mail threats, Web- threats, Intruders and Hackers, Insider threats, SQL injection Attacks, Ransomware. Malware: Worms, Virus, Spams, Adware, Spyware, Trojans. Security Technology : Firewalls, Intrusion detection and prevention systems, Scanning and Analysis Tools: Biometric access controls, Cipher methods, Cryptographic algorithms, Cryptographic tools, Protocols for secure communication. Keywords: Phishing, SQL injection, Worms, Computer virus, Spyware, Trojans, Firewall, Cipher, Cryptography.</p>	10

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B.Sc. II Year
Course Code – SZCOS1T (Major – I)
Subject: Computer Science

Course Title : Computer Networks & Information Security

VI	<p>Computer and Cyber-crimes: Cyber-crimes and related concepts, distinction between cyber-crimes and conventional crimes, Cyber criminals and their objectives. Kinds of cyber-crimes, cyber stalking, forgery and fraud, crime related to IPRs, cyber terrorism, Ransom ware attacks, computer vandalism.</p> <p>Cyber Laws – Introduction to IT laws & Cyber Crimes – Internet, Hacking, Cracking, Viruses, Virus Attacks, Software Piracy, Intellectual property, Legal System of information Technology, Social Engineering, Mail Bombs, Bug Exploits. Scope of cyber laws: e-commerce, online contracts, IPRs (copyright, trademarks and software patenting), e-taxation; e-governance and cyber-crimes, Cyber law in India with special reference to Information Technology Act, 2000 and Recent amendments.</p> <p>Keywords: cyber-crime, cyber stalking, cyber-fraud, IPR, IT laws, e-commerce, e-taxation, e-governance, mail bombs.</p>	10
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PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

- Andrew S. Tanenbaum, Nick Fearnster, David J. Wetherall, Computer Networks, 6th Edition, (2021) Pearson.
- Michael E Whitman and Herbert J Mattord, principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
- M. Merkow, J. Breithaupt, Information Security Principles and Practices, 2nd Edition, 2014, Pearson Education.
- G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning.
- Praveen Kumar Shukla, Surya Prakash Tripathi, Ritendra Goel "Introduction to Information Security and Cyber Laws", 2014, Dreamtech Press.
- Falyaz Ahamad, KLSI "Cyber Law and Information Security ", 2013, Dreamtech Press.
- Books published by M.P. Hindi Granth Academy, Bhopal

Reference books:

- Kurose James F., Ross Keith W., Computer Networking, A Top-Down Approach, Sixth Edition, 2017, Pearson
- Micki Krause, Harold F. Tipton, Handbook of Information Security Management; Vol.1-3, CRC Press LLC.
- B.A. Forouzan : Data Communication and Networking, Fourth edition, TMH Publishing Company Ltd.
- Basta, W.Halton, Computer security: Concepts, Issues and Implementation, Cengage Learning India.

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Department of Mathematics
Session 2023 - 2024
B.Sc. II Year
Course Code – S2COS1T (Major – I)
Subject: Computer Science
Course Title : Computer Networks & Information Security

Suggested digital platform web links

1. <https://www.youtube.com/watch?qiR5rTSshw>
2. Free CCNA | Network Fundamentals – Day 1 (<https://www.youtube.com/watch?v=n2D1o-aM-2s>)
3. Free CCNA | Network Devices <https://www.youtube.com/watch?v=H8W9oMNSuqo>
4. Free CCNA | OSI Model & TCP /IP Suite (<https://www.youtube.com/watch?v=t-ai8JzhHuY>)
5. Free CCNA | Interfaces and Cables | Day3 (<https://www.youtube.com/watch?v=ieTH51VhNaY>)
6. Free CCNA | Intro to the CLI | Day 4 (<https://www.youtube.com/watch?v=IYbtai7Nu2g>)
7. Free CCNA | Ethernet LAN Switching (Part 1) Day 5 (<https://www.youtube.com/watch?v=u2n762WGOVo>)
8. e CCNA | Analyzing Ethernet Switching | Day 6 Lab (<https://www.youtube.com/watch?v=lg0dSaOQDI8>)
9. Free CCNA | IPv4 Addressing (Part 1) | Day 7 (<https://www.youtube.com/watch?v=3ROdsEUuhs>)
10. Free CCNA | IPv6 Part 1 | Day 31 (<https://www.youtube.com/watch?v=ZNuXyOXae5U>)
11. Free CCNA | IPv6 Part 3 | Day 33 (<https://www.youtube.com/watch?v=rwHfsQWQwy8>)
12. <https://www.mphindigranthacedemy.org/>

Suggested equivalent online courses

NPTEL:

1. Demystifying Networking (04 weeks)
2. Cyber Security (15 Weeks)
3. <https://www.edx.org/learn/computer-networking>

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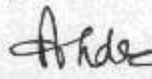
Dr. Nisha Paliwal



Dr. Sameer Shrivastava

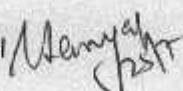
Dr. Vijay Khare

Dr. Anuj Hundet



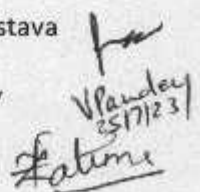
Dr. Vimmy Pandey

Dr. Sudipta Sanyal

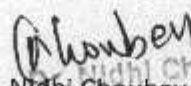


Dr. Ashok Verma

Ms. Zainab Fatima



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Department of Mathematics

Session 2023 - 2024

B.Sc. II Year

Course Code – S2COS1T (Major – I)

Subject: Computer Science

Course Title : Computer Networks Lab

PART B: Content of the Course	
No of Lab. Practicals (in hours per week): 1 Hrs. per week	
Total No. of Lab : 30 Hrs. Credit :- 0	
Suggestive List of Practicals	
	No. of Lectures
<p>1. Study of UTP network cable</p> <ul style="list-style-type: none">○ Study the color code of UTP cable○ Category of UTP n/w cable○ Shielding of n/w cable○ Electricity interference with n/w cable○ Maximum length for which data cable can be used○ Crimping of RJ45 connector and Punching of data n/w cable○ Penta scanning of cabling work○ Rules of UTP laying <p>2. Knowledge of Structured Cabling and its components</p> <ul style="list-style-type: none">○ Information outlet with box○ Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)○ Patch Panel○ Rack Management <p>3. Study of Optical Fiber cable</p> <ul style="list-style-type: none">○ Different cores of OFC (6core, 12, 24 core)○ Multimode & Single mode OFC cable○ Shielding of OFC○ Splicing /Termination of OFC○ OTDR Testing○ LIU fixing○ LIU management (pigtail/fiber patchcord)○ Media Convertor○ SFP module○ Rules of OFC laying <p>4. Use of tools</p> <ul style="list-style-type: none">○ Crimping Tool○ Punching Tool○ Nose plier○ Wire Stripping and Cable Cutter○ Multimeter○ RJ45 RJ11 RJ12 Cat5 Cat6 Network Cable Tester○ In-Line Coupler (RJ45 F/F)○ RJ45 NETWORK SPLITTER ADAPTER 2-way.	30

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B.Sc. II Year

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Subject: Computer Science

Course Title : Computer Networks Lab

5. Configuration /Management of Local Area Network <ul style="list-style-type: none">○ Implementation of file and printer sharing.○ Installation of ftp server and client.○ Connect the computers in Local Area Network.○ Configuring Class A IP Address on LAN Connection in Computer LAB and then use following tools: ping, ipconfig, getmac, hostname, nslookup, tracert, arp, pathping, systeminfo.○ Configure static routing using packet tracer software.○ Configure Dynamic routing using packet tracer.○ Configure VLAN using managed switch Device / Packet tracer.○ Implementation of Subnetting in Class A, b and C○ Ping between 2 systems using IPv6○ Configuration of NAT for incoming packet request.○ Configuration of Software / Hardware firewall to block outgoing requests to facebook.com	
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PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

- Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- Michael E Whitman and Herbert J Mattord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
- Books published by M.P. Hindi Granth Academy, Bhopal

Reference Books:

- Hacking Exposed, Stuart McClure, Joel Scrambray, George Kurtz, TMH.
- Computer Security Art and Science, Matt Bishop, Pearson/PHI.

Suggestive digital platform web links

<https://www.edx.org/learn/computer-networking>

<http://www.mphindigranthacademy.org/>

Suggested equivalent online courses

<https://nptel.ac.in/courses/106/105/106105081/>

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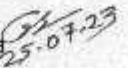
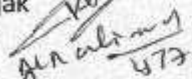

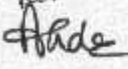
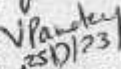
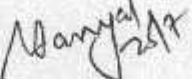
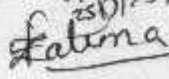
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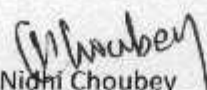
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 Department of Mathematics
 Session 2023 - 2024
 B.Sc. II Year
 Course Code – 52-COSC2T

Subject: Computer Science (Major – II) /Minor/Elective
 Course Title : Object Oriented Programming with Java

PART B: Content of the Course		
(No of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures (in hours) : 60 Hrs.		Credit :- 04
Module	Topics	No. of Lectures
I	<p>OOPS – Object Oriented Paradigm, Benefits of OOP, Applications of OOP. JAVA- History , Java Features, How Java Differs from C and C++ , Java and internet, Java and World Wide Web, Web Browsers, Hardware and Software Requirements, Java Supports Systems, Java Environment. Java Program Structure – Java Tokens, Java Statements Implementing a Java Program, Java Virtual Machine, Command Line Arguments, and Programming Style. Keywords : OOPS, JVC, WWW, Java Environment</p>	12
II	<p>Java Basics – Constants , Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variable, Symbolic Constant, Type Casting, Getting Values of Variables, Standard default Values. Operators – Arithmetic Operator, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bitwise Operators, Special Operators. Arithmetic Expressions – Evaluation of Expression, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operators Precedence and Associativity, Mathematical Functions. Decision Making with if Statement, Simple if Statement , ifElse Statement, Nesting of ifelse Statement, if-else Ladder, The Switch Statement, The? Operator. Loops – While Statement, Do Statement, For Statement, Jump in Loops, Labeled Loops. Keyword : Operators, Arithmetic Expressions, Decision Making, Loops.</p>	12

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Department of Mathematics

Session 2023 - 2024

B.Sc. II Year

Course Code – 52-COSC2T

Subject: Computer Science (Major – II) /Minor/Elective

Course Title : Object Oriented Programming with Java

III	<p>Class - Defining a Class, Adding Variables, Adding Methods, creating Objects, Accessing Class Members,</p> <p>Constructors – definition and types, Methods Overloading, Static Members, Nesting of Methods.</p> <p>Inheritance – Extending a Class, Overloading Methods, Final Variables and Methods, Final Classes, Finalize Methods, Abstract Methods and Classes, Visibility Control Arrays, One Dimensional Array, Strings, Vectors, Wrapper Classes. Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.</p> <p>Keywords: Class, Constructors, Inheritance, Final, Abstract Methods, Overloading.</p>	12
IV	<p>Java API Packages – Using System Packages, Naming Conventions, Creating Packages, Accessing a Packages, Using a Packages, Adding a Class to a Packages, and Hiding Classes. Creating Threads, Extending the Thread Class, Stopping and Blocking a Threads, Life Cycle of a Thread, Using Threads Methods, Threads Exceptions, Threads Priority, Synchronization, Implementing the 'Runnable' interface.</p> <p>Types of Errors – Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statements, Throwing Our Own Exceptions, Using Exceptions for Debugging.</p> <p>Preparing to Write Applets – Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web page, Applet Tag, Adding Applet to HTML File, Running the Applet.</p> <p>Keywords – API, threads, synchronization, errors, Applets, debugging.</p>	12
V	<p>More About the Applet tag - Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numbering Values, Getting Input from the user.</p>	12

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B.Sc. II Year

Course Code – S2-COSC2T

Subject: Computer Science (Major – II) /Minor/Elective

Course Title : Object Oriented Programming with Java

<p>The Graphics Class – Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts.</p> <p>Concept of Stream – Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams,</p> <p>Other Useful I/O Classes – Using the File Class, Input / Output Exceptions, creation of Files, Reading / Writing Characters, Reading / Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Random Access, Files, Interactive Input and Output other Stream Classes.</p> <p>Keywords : Stream, files, Graphics class, buffering, HTML tags.</p>	
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PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Text Books –

- E Balguruswami, Programming with Java, Tata McGraw – Hill Publication.

Reference Books:

- Bruce Eckel, Thinking in Java.
- Herbert Schildt, Java : The Complete Reference.
- Y. Daniel Liang, Introduction to Java Programming.
- Paul Deitel, Harvey Deitel, Java : How To Program.
- Cay S. Horstmann, Core Java Volume I – Fundamentals.
- Java Projects, BPB Publication.
- Dr. S. S. Kandare, Programming in Java, S Chand Publication.
- Books published by M.P. Hindi Granth Academy, Bhopal.

Suggestive digital platform web links

<https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/download/java/LearnJava.pdf>

https://www.tutorialspoint.com/java/java_tutorial.pdf

<https://www.youtube.com/watch?v=7s3xDfdqfDw>

<http://www.mphindigranthacademy.org/>

Suggested equivalent online courses

<https://nptel.ac.in/courses/106/105/106105191//>

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Department of Mathematics

Session 2023 - 2024

B.Sc. II Year

Course Code – S2-COSC2T

Subject: Computer Science (Major – II) /Minor/Elective

Course Title : Java Programming Lab

PART B : Content of the Course

No. of Lab Practical's (in hours per week): 1 Hr. per week

Total No. of Lab. : 30 Hrs.

Suggestive List of Practical's

(Using any Text editor : Notepad/ Eclipse/Netbeans/Sublime etc.)

1. Find greater number between two numbers – using conditional operator.
2. Find the factorial of number if number is given by user using command line argument.
3. Write a program to check if a number is prime or not.
4. Write a program to display tables from 2 to 10.
5. Write a program to print Fibonacci series.
6. Enter a no. and check whether it is even or odd.
7. Write a program to find sum & average of 10 no. using arrays.
8. Write a program to display reverse of a digit no. using array.
9. Write a program to demonstrate function overloading.
10. Write a program to display grade according to the marks obtained by the student.
11. Write a program to calculate the salary of an employee if salary is greater than or equal to 20000 and year of service is greater than or equal to 5 years then bonus will be 2000 otherwise 1000 and print gross salary of employee.
12. Write a program to convert the given no. of days into months & days using with classes, object and method.
13. Write a program to convert given string into Uppercase and lowercase and get length of string using array.
14. Create a package called "Arithmetic that contains methods to deal all arithmetic operations. Also write a program to use the package.
15. Write a program to demonstrate use of constructor and destructor.
16. Define an exception called "Marks out of Bound" exception that is thrown if the entered marks are greater than 100.
17. Write a program using application of single inheritance. Find the area of rectangle & volume of cube.

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B.Sc. II Year

Course Code – S2-COSC2T

Subject: Computer Science (Major – II) /Minor/Elective

Course Title : Java Programming Lab

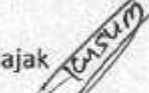
	<p>18. Develop a simple real life application to illustrate the use of multithreading.</p> <p>19. Write a program using multiple inheritance to calculate area and perimeter of a circle using interface.</p> <p>20. Write an applet program to draw a Rectangle (color = orange) and a right aligned oval.</p> <p>21. Develop an applet that receives 3 numeric values as inputs from the user and then displays the largest no. on the screen.</p> <p>22. Write a Java program to read data from the inputted text file name, and print its content on the console.</p> <p>23. Write a Java Program to merge two files into third file.</p> <p>24. Write a Java program to delete duplicate lines in text file.</p> <p>25. Write a Java Program to implement FileInputStream class to read binary data from any image file.</p>	
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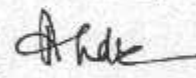


Dr. Sameer Shrivastava

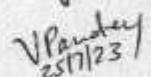


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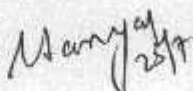
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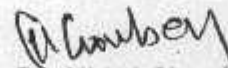
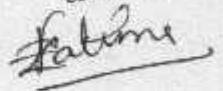


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Department of Mathematics & Computer

SESSION – 2023 – 2024

B.Sc. III Year Computer Science

(Group A- PAPER I) - Operating System

Course Code - S3-COSC1D

PART B: Content of the Course		
(No of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures (in hours) : 60 Hrs.		Credit :- 04
Module	Topics	No. of Lectures
I	Introduction to Operating System : What is Operating System? History and Evolution of OS, Basic OS functions, Resources Abstraction, Types of Operating Systems – Multiprogramming System, Batch Systems, Time Sharing Systems: Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems. Keywords : Functions of OS, resources abstractions, multiprogramming, time sharing, workstation.	4
II	Process Management: Process Concepts, Process states & Process Control Block. Process Scheduling : Scheduling Criteria, Scheduling Algorithms (Preemptive & Non-Preemptive) – FCFS, SJF, SRTN, RR, Priority, Multiple – Processor, Real – Time, Multiple Queue and Multilevel Feedback Queue Scheduling. Deadlock – Definition , Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock . Deadlock Handling Approaches : Prevention, Avoidance, Detection and Recovery. Keywords : Process states, preemptive and non-preemptive scheduling, FCFS, SJF, RR, deadlock.	10
III	Memory Management: Introduction, Address Binding, Logical Versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms. File Management : Concept of File System (File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods), Directory Structure (Single-Level, Two-Level, Tree-Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed). Keywords : swapping, fragmentation, paging, virtual memory, file management, directory structure.	10

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<p>IV</p>	<p>Disk Management : Structure, Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Swap Space Management, Disk Reliability, Recovery. Security: Security Threats, Security policy mechanism, Protection, Trusted Systems, Authentication and Internal Access Authorization, Windows Security. LINUX : Introduction, History and features of Linux, advantages, hardware requirements for installation, Linux architecture, file system of Linux – boot block, super block, inode table, data blocks. Linux standard directories, Linux kernel, Partitioning the hard drive for Linux, installing the Linux system, system – startup and shut – down process, init and run levels. Process, Swap, Partition, fdisk, checking disk free spaces. Difference between CLI OS & GUI OS, Windows v/s Linux, Importance of Linux Kernel, Files and Directories. Concept of Open Sources Software. Keywords : disk scheduling, recovery, authorization, boot block, kernel, partitioning, open source.</p>	<p>10</p>
<p>V</p>	<p>Linux Administration : Types of user – Root and normal user, Multiple logins at same time (Ctrl + Alt + F1, F2....F6), who command. Help : whatis, --help, man command. Basic Commands : For displaying current directory, files and directories of current/absolute/relative location(s), creating, removing, renaming, copying and moving files or directories For comparing, and editing file content, displaying file content(s) with tr, head tail, last, grep, sort, piping. Searching file content or searching file within different directories based on particular search criteria. For implementing general purpose utilities – calendar, date, calculator, basic arithmetic expressions, compression and extraction of file/directory. Text editors : vi, joe, vim, gedit, atom, nano etc. Command mode & Insert mode, cut, yank, undo. Managing multiple processes : connecting processes with pipes, tee, redirecting input output, changing process priority with nice, cron commands , kill, ps. Managing user accounts – Sudo, users: useradd, usermod, userdel, passwd. Group : Primary & Secondary Group, chgrp, chown, groupadd, groupdel. Permissions: adding and removing permissions. Package installation through GUI/ apt-get/yum/dnf. Keywords : head, tail, grep, sort, piping, yank, kill, chgrp, chown, groupadd.</p>	<p>14</p>

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& Science for Women, Jabalpur

VI	<p>Shell Programming: : Types of Shells, Shell Meta Characters - \$#, \$*, \$?, Shell Variables, Shell Scripts, Debugging scripts, echo, read, operators, keywords, Integer Arithmetic and String Manipulation, Functions, I/O Redirection and Piping.</p> <p>Decision Making: if-else-elif-fi, case-esac.</p> <p>Loop Control: while, for, until, break & continue..</p> <p>Automation and Exception Handling: Creating shell programs for automating tasks, file handling, trapping signals etc.</p> <p>Android Operating System: Introduction, Development Framework, Application Architecture, Process Management and File System, Small Application Development using Android Development Framework.</p> <p>Indian contribution to the field -the BOSS operating system, open source softwares, growth of LINUX, Aryabhata Linux, contributions of innovators - Rajen Sheth, Sunder Pichai etc.</p> <p>Keywords: shell programming, exception handling, Android development framework. BOSS OS, Linux, Arya Bhatt, Rajen Sheth, Sunder Pichai.</p>	12
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PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

- A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, John Wiley Publications.
- A.S. Tanenbaum, Modern Operating Systems, Pearson Education.
- J.L.Peterson, Operating System Concepts.
- Sumitabh Das, Linux, TMH.

Reference Books:

- G. Nutt, Operating Systems: A Modern Perspective, Pearson Education.
- W. Stallings, Operating Systems, Internals & Design Principles, Pearson Education.
- M. Milenkovic, Operating Systems- Concepts and Design, Tata McGraw Hill.

Suggestive digital platform web links

<https://web.iitd.ac.in/~minati/MTL458.html>

<https://www.cse.iitb.ac.in/~mythili/os/>

<https://www.youtube.com/watch?v=aCJ3YgoolHQ>

Suggested equivalent online courses

<https://nptel.ac.in/courses/106/102/106102132/>

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SESSION – 2023 – 2024
B.Sc. III Year Computer Science
(Group A- PAPER I)- Operating System

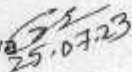
PART B: Content of the Course	
No. of Lab. Practicals (in hours per week): 1 Lab. per week	
Total No. of Lab.: 30 Hrs. Suggestive List of Practicals	
I Linux:	<p>a) Linux Directory Commands: pwd, mkdir, rm -rf, ls, cd, cd / cd ~</p> <p>b) Linux File Commands: touch, cat, cat, cat >>, rm, cp, mv, rename</p> <p>c) Linux Permission Commands: su, id, useradd, passwd, groupadd, chmod, groupdel, chown, chgrp</p> <p>d) Linux File Content & Filter Commands: head, tail, tac, more, lss, grep, cat, cut, grep, comm, sed, tee, tr, uniq, wc, od, sort, diff.</p> <p>e) Linux Utility Commands: find, bc, locate, date, cal, sleep, time, df, mount, exit, clear, gzip, gunzip.</p> <p>f) Linux Networking Commands: ip, ssh, mail, ping, host</p> <p>g) Edit Crontab file: to wall message on system on particular time automatically.</p> <p>h) Vi editor: Create file, edit, save and quit. Highlighting the searched term within a file, cut, yank, undo.</p>
II Shell Scripting:	<p>a) Write a shell script to print a message.</p> <p>b) Write a shell script to access arguments passed on command line</p> <p>c) Write a shell script to create files with the names passed on command line</p> <p>d) Write a shell script to input number from user and display its factorial.</p> <p>e) Write a shell script to input file name and create multiple directories individually for the name in the file given.</p> <p>f) Write a shell script to input number from user and display whether it is prime number or not.</p> <p>g) Write a shell script to list all the files in any directory given by the user</p> <p>h) Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory.</p>

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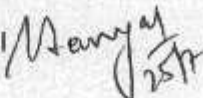


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Dr. Vijay Khare

Dr. Sudipta Sanyal



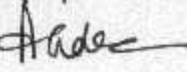
Dr. Kusumlata Rajak



Dr. Nisha Paliwal



Dr. Anuj Hundet



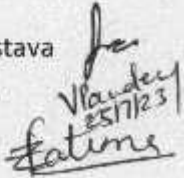
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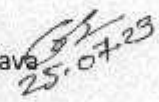


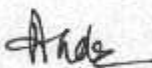
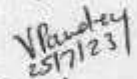
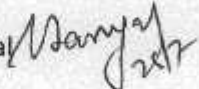

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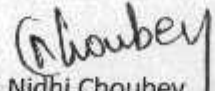

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(Group A- PAPER I)- Operating System

PART C: Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings
<ul style="list-style-type: none">• Richard Peterson, Linux: The Complete Reference, TMH• Sumitabh Das, Linux, McGraw Hill• Jason Cannon, Linux for Beginners, Createspace Independent Publishing Platform• William E. Shotts Jr., The Linux Command Line: A Complete Introduction, O'Reilly Media, Inc.
Suggestive digital platform web links https://web.iitd.ac.in/~minati/MTL458.html https://www.cse.iitb.ac.in/~mythili/os/ https://www.youtube.com/watch?v=aCJ3YgoolHQ
Suggested equivalent online courses https://nptel.ac.in/courses/106/102/106102132/ https://www.youtube.com/watch?v=OHCMfsNpCc

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Dr. Vijay Khare	Dr. Anuj Hundet  Anuj	Dr. Vimmy Pandey  V.Pandey 25/7/23
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 Department of Mathematics
 Session 2023 - 2024
 B.Sc. III Year
 Subject: Computer Science

Course Title : Programming with Python (Group A - Paper II) ~~Elective~~

S3-COSC2D PART B: Content of the Course		
(No of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures (in hours) : 60 Hrs.		Credit :- 04
Module	Topics	No. of Lectures
I	<p>Python Basics: Python interpreter, Python idle, dynamically typed and strongly typed features, basic data types, variables, expressions, statements, operators, flow of execution. Input and Output statements, Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else). Iteration: while, for, break, continue, pass, implementing 'for' through range(), 'in' and 'not in' operators for sequence traversal. Creating and executing .py scripts.</p> <p>Keywords: interpreter, while, for, break, continue, scripts.</p>	12
II	<p>Data Structures: Lists- append, extend, insert, index, remove, pop, count, sort, reverse, slicing, list comprehension, Copying a list: deep copy, shallow copy. Tuples- index, count, usage, use of tuples as a swap function. Dictionaries-keys, values, tuples, nested dictionaries, dictionary comprehension. Strings- Single line and multi-line strings, formatter, isdigit, isalpha, isalnum, islower, istitle, isspace, title, lower, upper, strip, split, splitlines, join etc. Sets union, intersection, subset, superset, difference, symmetric difference, copy, add, remove, discard etc.</p> <p>Keywords: index, sort, deep copy, tuples, dictionary, sets, strings.</p>	12
III	<p>Functions & File Handling: Inbuilt Functions- id, len, chr, ord etc., defining and calling a function, arguments, global versus local variables, defining and using lambda functions, the map(), filter(), reduce() functions. Working with files read, write and append modes: r, w, a, x, r+, w+, a+, x+, reading-read(), readline(), readlines(), writing-write(), writelines(), seek(), tell(). Word count, copy file scripts through file handling concepts.</p> <p>Keywords: function, calling a function, arguments, global variables, read, write, copy, seek.</p>	12

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Course Title : Programming with Python (Group A - Paper II) /Minor/Elective

IV	<p>Classes, modules and exceptional handling: Classes: Introduction, Member variables and defining methods, constructor, destructor, data encapsulation, inheritance, multiple inheritance, diamond problem solving technique of python. Modules: inbuilt modules- sys, random, time etc. import, from...import, from..import*. Constructing packages, role of Exceptional Handling: The try-except-else-finally block, the raise statement, the hierarchy of exceptions, adding exceptions</p> <p>Keywords: class, constructor, destructor, encapsulation, inheritance, exception, modules.</p>	12
V	<p>Database & GUI Programming: Importing sqlite, connecting to database, creating table, insert, select, update, delete, drop tables, accessing and modifying tables through python. Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI; buttons, labels, entry fields, dialogs; widget attributes - sizes, fonts, colors layouts, nested frames.</p> <p>Keywords: GUI, tables, database, insert, update, drop tables, event-driven programming, dialogs, frames.</p>	12

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

- Taneja Sheetal & Kumar Naveen, "Python Programming: A modular approach", pearson.
- Liang Y. Daniel, "Introduction to Programming Using Python", Pearson.

Reference Books:

- Zed A. Shaw, "Learn Python the Hard Way", Zed Shaw's Hard Way Series.
- Charles Dierbach, "Introduction to Computer Science using Python", Wiley.
- Michael T. Goodrich, "Data Structures and Algorithms in Python", Wiley.

Suggestive digital platform web links

<https://www.guru99.com/how-to-install-python.html>

<https://www.udemy.com/course/pythonforbeginnersintro/>

<https://www.python.org/about/gettingstarted/>

<https://spoken-tutorial.org/media/videos/89/Python-3.4.3-Instruction-Sheet-English.pdf>

Suggested equivalent online courses

<https://nptel.ac.in/courses/106/106/106106145/>

<https://www.youtube.com/watch?v=rfscVS0vtbw>

https://onlinecourses.swayam2.ac.in/aic20_sp33/preview

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Session 2023 - 2024
B.Sc. III Year
Subject: Computer Science

Course Title : Python Programming Lab (Group A - Paper II) /Minor/Elective

PART B: Content of the Course	
No. of Lab. Practicals (in hours per week): 1 Lab. per week	
Total No. of Lab.: 30 Hrs. Suggestive List of Practicals	
<ol style="list-style-type: none"> 1. Find all numbers which are multiple of 17, but not the multiple of 5, between 2000 and 2500. 2. Print the first 2 and last 3 characters in a given string. Use the string slicing. 3. Write a program that eliminates duplicates in a list. 4. Implement shallow copy and deep copy of a list. 5. Find the largest of n numbers, using a user defined function largest() 6. Write a function that capitalizes all vowels in a string. 7. Read a line containing digits and letters. Write a program to give the count of digits and letters. 8. Write a function myReverse() which receives a string as an input and returns the the string. 9. Use the list comprehension methodology in python, to generate the squares of all odd numbers in a given list. 10. Generate a dictionary and print the same. The keys of the dictionary should be integers between 1 and 10 (both inclusive). The values should be the cubes of the corresponding keys. 11. Create a nested dictionary. The roll number of a student maps to a dictionary. This inner dictionary will have name, age, and place as keys. Read details of at least three students. 12. Enter a word. Create a dictionary with the letters of this word as keys, and the corresponding ASCII values as values. 13. Define a class with three methods: readString(), printString(), writeString(). The first method should read the contents of a file. The second method should print the contents to the console. The third method should write the contents to a new file. 14. Create a class account which has constructor to input account_no, name, balance from user, print_account() to display the account details, and deposit(), withdraw which inputs amount and add/subtract them from the total amount of individual object. 15. Create a database table in sqlite and show the table data in python. 16. Implement DML commands in SQLite from python interface. 17. Implement tkinter methods in a python script. 	30

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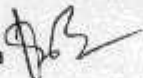
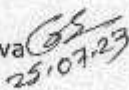
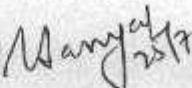

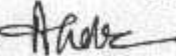

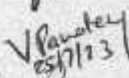
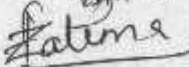
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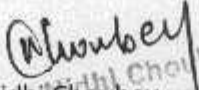
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Department of Mathematics
Session 2023 - 2024
B.Sc. III Year
Subject: Computer Science
Course Title : Python Programming Lab (Group A - Paper II) /Minor/Elective

PART C: Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings
<p>Textbooks:</p> <ul style="list-style-type: none"> Taneja Sheetal & Kumar Naveen, "Python Programming: A modular approach", Pearson. Liang Y. Daniel, "Introduction to Programming Using Python", Pearson. <p>Reference Books:</p> <ul style="list-style-type: none"> Zed A. Shaw, "Learn Python the Hard Way", Zed Shaw's Hard Way Series. Charles Dierbach, "Introduction to Computer Science using Python", Wiley. Michael T. Goodrich, "Data Structures and Algorithms in Python", Wiley. <p>Suggestive digital platform web links</p> <p>https://www.guru99.com/how-to-install-python.html https://www.python.org/about/gettingstarted/ https://spoken-tutorial.org/media/videos/89/Python-3.4.3-Instruction-Sheet-English.pdf</p> <p>Suggested equivalent online courses</p> <p>https://nptel.ac.in/courses/106/106/106106145/ https://www.youtube.com/watch?v=rfscVS0vtbw https://onlinecourses.swayam2.ac.in/aic20_sp33/preview</p>

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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year

Subject: Computer Science

Course Title- PHP & MySQL (Group B – Paper I) (Theory)

PART B: Content of the Course		
(No of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures (in hours) : 60 Hrs.		Credit :- 04
Module	Topics	No. of Lectures
I	Introduction - Introduction to internet & World Wide Web, Internet Addressing, Browsers, URL, Web Development, Domain Names - Basic concepts. HTML - History of HTML, HTML working, Structure of HTML documents, Tags and attributes, Tag vs. element. HTML Basic tags, Basic formatting tags, HTML color coding, Lists, Images, Tables and Hyperlink. Keywords: Browser, URL, domain name, HTML, hyperlink.	7
II	Grouping - Using Div and Span tags for grouping. HTML Forms - input, textarea, button, select, label. HTML Headers – Title, Meta, Base, Link, Style, Script. CSS Basic Concept of CSS, Benefits of CSS, Deprecated HTML Tags, CSS Syntax. CSS Selectors - Based on tag name, Id, Class. CSS Types - Inline, Internal, External. CSS Properties - Background, Text, Fonts, List, Tables, Border, Margin, Padding, Float, Position. Keywords: textarea, script, link, style, script, css.	7
III	Scripting: Client Side vs. Server Side. JavaScript: introduction, Syntax review, keywords, variable declaration, data types, expressions & operators, using comments. Interacting with users - Creating alert dialogs, prompts, getting confirmations from users, understanding functions. BASICS OF PHP: Introduction to PHP, what does PHP Do?, Object Oriented Programming with PHP, language basics, installation of XAMPP/LAMP, syntax, comments, variables, constants and data types, expressions and operators, flow control statements, including html code in PHP, embedding PHP in web pages. Keywords: client side and server side script, javascript, php, XAMPP, LAMP	10

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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year

Subject: Computer Science

Course Title- PHP & MySQL (Group B – Paper 1) (Theory)

IV	<p>FUNCTIONS & STRINGS in PHP: Defining a function, Calling a function, variable scope, function parameters, return values, predefined functions.</p> <p>Strings: Creating & accessing string, searching and replacing strings, encoding and escaping, comparing strings, formatting strings, regular expression.</p> <p>Keywords: client-side and server-side script, JavaScript, php, XAMPP, LAMP.</p>	8
V	<p>Data & File Handling: PHP Forms: \$_GET, \$_POST, \$_REQUEST, \$_FILES, \$_SERVER, \$GLOBALS, \$_ENV, input/output controls, validation, Cookies and Sessions.</p> <p>File Handling: File and directory, open, close, read, write, append, delete, uploading and downloading files. File exists, File Size, Rename. Reading and display all/selected files present in a directory.</p> <p>Keywords: data and file handling, cookies, sessions, file handling, file size.</p>	10
VI	<p>MYSQL AN OVERVIEW: Introduction, phpMyAdmin, Entering queries, Creating and using a database, Creating and selecting a database, creating a table, loading data into a table, Retrieving information from a table, selecting all data, selecting particular rows, selecting particular columns, sorting, date, calculations, working with NULL values, pattern matching, counting rows, using more than one tables.</p> <p>Keywords: mysql, queries, creating table, loading data into table, pattern matching.</p>	8
VII	<p>MYSQL DATABASES IN PHP: Introduction, connecting to a MySQL database, querying the database, Retrieving and displaying the results, modifying data and deleting data through front end. Designing applications using PHP & MySQL.</p> <p>Keywords: mysql, modify data, php.</p>	10

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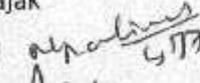
Dr. Kusumlata Rajak

Dr. Shailja Shukla

Dr. Geeta Shrivastava



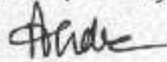
Dr. Nisha Paliwal



Dr. Sameer Shrivastava

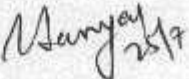
Dr. Vijay Khare

Dr. Anuj Hundet



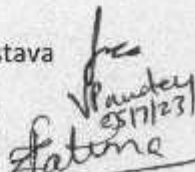
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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year

Subject: Computer Science

Course Title- PHP & MySQL (Group B – Paper 1) (Theory)

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

- Jon Duckett, Html And Css: Design And Build Websites, Wiley
- Jenifer Niederst Robbins, Learning Web Design: A Beginner's Guide To Html, Css, Javascript And Web Graphics, O'Reilly
- Steven M. Schafer, HTML, XHTML, and CSS Bible, Wiley
- Felke-Morris, Basics of Web Design: HTML5 & CSS3, Pearson Education.
- Felke-Morris, Web Development & Design Foundations with HTML5, Addison-Wesley.

Reference Books:

- Steven M. Schafer, HTML, XHTML, and CSS Bible, Wiley India.
- Ian Pouncey, Richard York, Beginning CSS: Cascading Style Sheets for Web Design, Wiley India.
- Thomas A Powell, The complete Reference to HTML, Paperback.
- Lee Anne Philips, Using HTML, PHI
- C. Xavier, World Wide Web Design with HTML, New Age International.
- Laura Lemay, Mastering HTML, CSS & Javascript Web Publishing.
- HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, DT Editorial Services, Paperback
-

Suggestive digital platform web links

<https://www.udemy.com/course/web-design-secrets/>

<https://www.udemy.com/course/php-mysql-course-for-absolute-beginners/>

<https://www.simplilearn.com/learn-php-basics-free-course-skillup>

<https://www.coursera.org/learn/web-applications-php>

Suggested equivalent online courses

https://onlinecourses.swayam2.ac.in/aic20_sp32/preview

<https://www.udemy.com/course/php-mysql-tutorial/>

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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year

Subject: Computer Science

Course Title- PHP & MySQL Lab (Group B – Paper I) (Practical)

PART B: Content of the Course

No. of Lab. Practicals (in hours per week): 1 Lab. per week

Total No. of Lab.: 30 Hrs. Suggestive List of Practicals

<ol style="list-style-type: none">1. Create an HTML file (e.g. first_page.html) that specifies a page that contains a heading and two paragraphs of text. As the texts in the heading and paragraphs you can use any texts you like.2. Design a home page which displays information about your college department using paragraph and list tags. Insert images also.3. Create 3 Hyperlinks in home page connecting it to 3 different pages.4. Create 3 hyperlinks in a page, which jumps to 3 different headings on same page.5. Design a Registration form in HTML using HTML forms. Apply CSS on web page and various form controls.6. Implement javascript validation on a sign-up form. Organize the text and form controls within <table>, apply rowspan and colspan attributes.7. Design a web-page whose content can be changed using JavaScript events.8. Implement CSS backgrounds and borders in a web-page.9. Create a simple HTML form and accept the user name and display the name through PHP echo statement.10. Write a PHP script to demonstrate arithmetic operators, comparison operator, and logical operator.11. Write PHP Script to input marks, generate result and display grade.12. Write PHP Script for addition of two 2x2 matrices.13. Write PHP script to obtain factorial of a number using function14. Write PHP script to demonstrate string, date and math function.15. Create student registration form using text box, check box, radio button, select, submit button. And display user inserted value in new PHP page.16. Write two different PHP script to demonstrate passing variables through a URL.17. Write two different PHP script to demonstrate passing variables with sessions.18. Write PHP script to demonstrate passing variables with cookies.19. Write a program to keep track of how many times a visitor has loaded the page.20. Write PHP script to demonstrate exceptional handling.21. Write a PHP script to connect MySQL server from your website.22. Write a program to read customer information like cust_no, cust_name, Item_purchase, and mob_no, from customer table and display all these information in table format on output screen.	30
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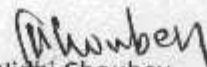
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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year

Subject: Computer Science

Course Title- PHP & MySQL Lab (Group B – Paper I) (Practical)

- | | |
|--|--|
| 23. Write a program to edit name of customer to "Bob" with cust_no =1, and to delete record with cust no=3. | |
| 24. Write a program to read employee information like emp_no, emp_name, designation and salary from EMP table and display all this information using table format. | |
| 25. Create a dynamic web site using PHP and MySQL. | |

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks:

- Jon Duckett, Html And Css: Design And Build Websites, Wiley
- Jenifer Niederst Robbins, Learning Web Design: A Beginner's Guide To Html, Css, Javascript, And Web Graphics, O'Reilly
- Steven M. Schafer, HTML, XHTML, and CSS Bible, Wiley
- Felke-Morris, Basics of Web Design: HTML5 & CSS3, Pearson Education.
- Felke-Morris, Web Development & Design Foundations with HTML5, Addison-Wesley.

Reference Books:

- Steven M. Schafer, HTML, XHTML, and CSS Bible, Wiley India.
- Ian Pouncey, Richard York, Beginning CSS: Cascading Style Sheets for Web Design, Wiley India.
- Thomas A Powell, The complete Reference to HTML, Paperback.
- Lee Anne Philips, Using HTML, PHI
- C. Xavier, World Wide Web Design with HTML, New Age International.
- Laura Lemay, Mastering HTML, CSS & Javascript Web Publishing.
- HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, DT Editorial Services, Paperback.

Suggestive digital platform web links

<https://www.udemy.com/course/php-mysql-course-for-absolute-beginners/>

<https://www.simplilearn.com/learn-php-basics-free-course-skillup>

<https://www.coursera.org/learn/web-applications-php>

Suggested equivalent online courses

https://onlinecourses.swayam2.ac.in/aic20_sp32/preview

<https://www.udemy.com/course/php-mysql-tutorial/>

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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year

Subject: Computer Science

Course Title- Cloud Computing (Group B - Paper II) (Theory)

PART B: Content of the Course		
(No of Lectures (in hours per week): 2 Hrs. per week		
Total No. of Lectures (in hours) : 60 Hrs.		Credit :- 04
Module	Topics	No. of Lectures
I	Cloud Computing - Introduction, Definition, characteristics, components, Cloud service provider, the role of networks in Cloud computing, Cloud deployment models - private, public & hybrid, Cloud service models, multitenancy, Cloud economics and benefits. Cloud computing platforms - IaaS: Amazon EC2, S3 Bucket, PaaS: Google App Engine, Microsoft Azure, SaaS: AWS IAM (Identity and Access Management). Keywords: cloud computing, models, IaaS, PaaS, Google app engine, Azure, SaaS, AWS.	12
II	Virtualization Virtualization concepts, Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, VMware hypervisors and their features. Introduction to Containerization Technology, Virtualization vs Containerization. Container Engine Tools: Docker/Podman Keywords: virtualization, hypervisors, Docker, Podman.	12
III	Data in cloud computing - Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map-Reduce model, Parallel efficiency of MapReduce, Relational operations using Map-Reduce, Enterprise batch processing using MapReduce. Keywords: cloud computing, GFS, HDFS, BigTable, MapReduce, batch processing.	12

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IV	<p>Cloud security - Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud.</p> <p>Cloud computing security architecture - General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro architectures; Identity Management and Access control, Autonomic security. Security challenges: Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications in cloud.</p> <p>Keywords: <i>cloud security, cloud security architecture.</i></p>	12
V	<p>Issues in cloud computing - Implementing real time application over cloud platform, Issues in Inter -cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment, Cloud Middleware, Mobile Cloud Computing, Inter Cloud issue, A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud.</p> <p>Keywords: <i>cloud environment, Quality of Service (QoS), sky computing, resource optimization, resource dynamic reconfiguration.</i></p>	12

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks

- Shroff Gautam, Enterprise Cloud Computing, Cambridge Publication.
- Ronald Krutz and Russell Dean Vines, Cloud Security, Wiley -India Dr.
- Kumar Saurabh, "Cloud Computing", Wiley Publication

Reference Books

- Bloor R., Kanfman M., Halper F. Judith Hurwitz "Cloud Computing for Dummies", Wiley India Edition.
- John Rittinghouse & James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press.
- Antohy T Velte, "Cloud Computing: A Practical Approach", McGraw Hill
- Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work Collaborate Online".
- James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers.

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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year

Subject: Computer Science

Course Title- Cloud Computing (Group B - Paper II) (Theory)

Suggestive digital platform web links

https://www.tutorialspoint.com/cloud_computing/cloud_computing_tutorial.pdf

<https://www.cse.iitb.ac.in/~cs695/>

[https://www.cse.iitb.ac.in/~convergence/workshops/Intro to Virtualization.pdf](https://www.cse.iitb.ac.in/~convergence/workshops/Intro%20to%20Virtualization.pdf)

Suggested equivalent online courses

<https://nptel.ac.in/courses/106/105/106105167/>

PART B: Content of the Course

No. of Lab. Practicals (in hours per week): 1 Lab. per week

Total No. of Lab.: 30 Hrs. Suggestive List of Practicals

30

Note - The students shall explore development of web applications in cloud. They must practically design and develop processes involved in creating a cloud based application and programming using Hadoop.

1. Download and Install Virtual Machine (Virtual Box, VMware and
2. Installing Virtual Machine
3. Controlling Virtual Machine (Start, restart, power off)
4. Editing Virtual Machine Hardware
5. Creating and Using Image snapshot
6. Importing and Exporting Virtual Machine images
7. Accessing Linux Command Line
8. Managing Files from the command Line
9. Creating, Viewing, and Editing Text Files
10. Installing and updating Software packages
11. Controlling Services
12. Create AWS free tier account
13. Introduction to IAM
14. Creating a User and Group
15. Authorization via Policies
16. Creating and Attaching Policies
17. Launching an EC2 running Linux
18. How to ssh into EC2 using Linux/Windows
19. Launching an EC2 running Windows
20. Connect Windows Instance using RDP

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Session 2023 - 2024

B.Sc. III Year

Subject: Computer Science

Course Title- Cloud Computing (Group B - Paper II) (Theory)

21. Hosting Website on EC2 Instance
22. Create AWS Custom AMI
23. Copy AMI from one region to another
24. Share AMI with AWS account
25. Create S3 Bucket
26. Upload/Download files from S3 Bucket
27. Containerized Application Using Docker container
28. Install docker on EC2 Instance
29. Creating and managing Docker containers
30. Pull and push docker images from docker hub
31. Creating Docker custom Images

PART C: Learning Resources

Textbooks, Reference Books, Other Resources

Suggested Readings

Textbooks

- Shroff Gautam, Enterprise Cloud Computing, Cambridge .
- Publication. Ronald Krutz and Russell Dean Vines, Cloud Security, Wiley -India.
- Dr. Kumar Saurabh, "Cloud Computing", Wiley Publication.

Reference Books

- Bloor R., Kanfman M., Halper F. Judith Hurwitz, "Cloud Computing for Dummies", Wiley India Edition.
- John Rittinghouse & James Ransome, "Cloud Computing Implementation Management and Strategy", CRC Press.
- Antohy T Velte, "Cloud Computing: A Practical Approach", McGraw Hill.
- Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online".
- James E Smith, Ravi Nair, "Virtual Machines", Morgan Kaufmann Publishers.

Suggestive digital platform web links

https://www.tutorialspoint.com/cloud_computing/cloud_computing_tutorial.pdf

<https://www.cse.iitb.ac.in/~cs695/>

https://www.cse.iitb.ac.in/~convergence/workshops/Intro_to_Virtualization.pdf

Suggested equivalent online courses

<https://nptel.ac.in/courses/106/105/106105167/>

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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year (Minor)

Paper Title- Data Analysis and Visualization with Python

PART A: Introduction

Program: Degree	Class: B.Sc.	Year: III Year	Session: 2023-24
Subject: Computer Science			
1.	Course Code	S3-COSC2T	
2.	Course Title	Data Analysis and Visualization with Python (Theory)	
3.	Course	Minor / Elective	
4.	Pre-Requisite (if any)	To study this course, a student must have successfully completed the course on Programming at Certificate/Diploma Levels.	
5.	Course Learning outcomes (CLO)	After studying this subject, students shall be able to - <ul style="list-style-type: none">• Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.• Express proficiency in the handling of strings, functions and file handling.• Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.• Develop proficiency in using NumPy for data manipulation.• Create a variety of data visualizations using Matplotlib.• Apply NumPy and Matplotlib to analyze and visualize real-world datasets.• Complete a hands-on project involving data manipulation and visualization.	
6.	Credit Value	Theory – 4 Credits	
7.	Total Marks	Max. Marks: 30+70	Min. Passing Marks: 35

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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year (Minor)

Paper Title- Data Analysis and Visualization with Python

PART B: Content of the Course

(No of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures (in hours) : 60 Hrs.

Credit :- 04

Module	Topics	No. of Lectures
I	<p>Python Basics: Python interpreter, Python idle, dynamically typed and strongly typed features, basic data types, variables, expressions, statements, operators, flow of execution. Input and Output statements, Conditionals: Boolean values and operators, conditional (if), alternative (if-else), chained conditional (if-elif-else). Iteration: while, for, break, continue, pass, implementing 'for' through range(), 'in' and 'not in' operators for sequence traversal. Creating and executing .py scripts.</p> <p>Keywords: interpreter, while, for, break, continue, scripts.</p>	12
II	<p>Data Structures: Lists- append, extend, insert, index, remove, pop, count, sort, reverse, slicing, list comprehension, Copying a list: deep copy, shallow copy. Tuples- index, count, usage, use of tuples as a swap function. Dictionaries-keys, values, tuples, nested dictionaries, dictionary comprehension. Strings- Single line and multi-line strings, formatter, isdigit, isalpha, isalnum, islower, istitle, isspace, title, lower, upper, strip, split, splitlines, join etc. Sets union, intersection, subset, superset, difference, symmetric difference, copy, add, remove, discard etc.</p> <p>Functions & File Handling : Inbuilt Functions-id, len, chr, ord etc, defining and calling a function, arguments, global versus local variables, defining and using lambda functions, the map(), filter(), reduce() functions.</p> <p>Keywords: index, sort, deep copy, tuples, dictionary, sets, strings, function, calling a function, arguments, global variables.</p>	14
III	<p>NumPy: Introduction to Numpy, NumPy array in Python, Basics of NumPy Arrays, comparison of Python Lists with Numpy Arrays.</p> <p>Array: Array Creation, The Arrange Method, The Zero Method, Numpy array filled with all ones, The linspace Method, The eye Method, Numpy Meshgrid function, empty and full NumPy array, Numpy array filled with all zeros, Numpy array filled with all ones, 2-D Gaussian array, Creating vector in Python using NumPy.</p> <p>Array Indexing, Array Slicing, Data Types, Copy vs View, Array Shape, Array Reshape, Array Iterating, Array Join, Array Split, Array Search, Array Sort, Array Filter, Concatenation of two arrays, Splitting and Comparison of Arrays, Binary Operations, Mathematical Function, String Operations.</p> <p>Keywords: NumPy Arrays, Array Reshape, NumPy Functions, Array Search, Gaussian Array.</p>	14

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Department of Mathematics

Session 2023 - 2024

B.Sc. III Year (Minor)

Paper Title- Data Analysis and Visualization with Python

IV	<p>Matrix in NumPy: Matrix manipulation in Python, empty() function, zeros() function, ones() function, eye() function, identity() function, Adding and Subtracting Matrices in Python. Vector Multiplication, Dot product of two arrays.</p> <p>Operations on NumPy Array: Broadcasting with NumPy Arrays, Sorting, Searching and Counting of NumPy arrays. Variations in different Sorting techniques in Python.</p> <p>Universal Functions: Creation of ufunc, Simple Arithmetic, Rounding, Trigonometric, Hyperbolic, Set functions.</p> <p>Keywords: NumPy Matrix, Broadcasting with NumPy Array, NumPy ufunc.</p>	12
V	<p>Data Visualization with Matplotlib: Overview of Matplotlib and its capabilities, Creating line plots and scatter plots, Customizing: labels, titles, colors, legends, Creating bar plots and histograms, Adding annotations and text to plots, Creating subplots and multiple plots, Saving and exporting plots.</p> <p>Advanced Data Visualization: Creating pie charts and box plots, Visualizing 3D data with Matplotlib, Interactive visualization using widgets.</p> <p>Keywords: Matplotlib Charts, Interactive Visualization, 3-D Plots with Matplotlib, subplots, multiplos.</p>	08

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 Session 2023 - 2024
 B.Sc. III Year (Minor)
 Paper Title- Data Analysis and Visualization with Python

PART B: Content of the Course	
No. of Lab. Practicals (in hours per week): 1 hour	
Total No. of Lab.: 30 Hrs.	
Suggestive List of Practicals	No. of labs
<ol style="list-style-type: none"> 1. Find all numbers which are multiple of 17, but not the multiple of 5, between 2000 and 2500. 2. Print the first 2 and last 3 characters in a given string. Use the string slicing. 3. Write a program that eliminates duplicates in a list. 4. Implement shallow copy and deep copy of a list. 5. Find the largest of n numbers, using a user defined function largest() 6. Write a function that capitalizes all vowels in a string. 7. Read a line containing digits and letters. Write a program to give the count of digits and letters. 8. Write a function myReverse() which receives a string as an input and returns the reverse of the string. 9. Use the list comprehension methodology in python, to generate the squares of all odd numbers in a given list. 10. Create a NumPy array with values from 1 to 20. 11. Create a 3×3 identity matrix using Numpy. 12. Generate an array of 10 random integers between 0 and 100. 13. Calculate the mean, median and standard deviation of an array. 14. Reshape a 1D array into a 2D array. 15. Filter even numbers from an array using Boolean indexing. 16. Calculate the dot product of two matrices. 17. Normalize an array to have values between 0 and 1. 18. Calculate the sum along both rows and columns of a 2D array. 19. Perform element-wise multiplication and division between arrays. 20. Generate a dataset of x and y values and plot it. 21. Analyze and visualize a simple data set (e.g., student grades) using both libraries. 22. Create a bar plot showing comparison of data from two different sources. 23. Visualize data from a CSV file using NumPy and Matplotlib. 24. Generate a contour plot of a 2D function. 25. Analyze and visualize trends in a dataset over time. 26. Create an interactive plot using Matplotlib's interactive mode. 	<p>30</p>

Signature of Members of Board of Studies

Dr. K. S. Bhatia

Dr. Kusumlata Rajak

Dr. Shailja Shukla

Dr. Geeta Shrivastava

Dr. Nisha Paliwal

Dr. Sameer Shrivastava

Dr. Vijay Khare

Dr. Anuj Hundet

Dr. Vimmy Pandey

Dr. Sudipta Sanyal

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Ms. Zainab Fatima

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