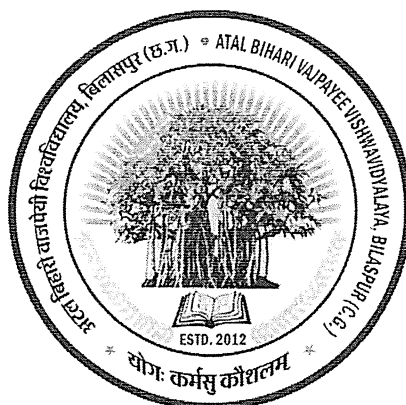


Atal Bihari Vajpayee Vishwavidyalaya, Bilaspur (C.G.)



M. Sc. (IT)

(w.e.f. 2023-2024)

Program Code: MSCITR113

PROGRAMME OUTCOMES (POs):

After the completion of the program students will be able to:

PO-1: Understand use of advanced computing techniques and tools.

PO-2: Understand and apply programming knowledge to solve complex problems not just by using technology, but also to contribute in creation of new & emerging technologies which meet the desired needs of industry and society.

PO-3: Understand the impact of technology & its applications and provide solutions to the end user in a cost effective and efficient manner.

PO-4: To adapt existing design patterns, techniques, algorithms, data structures, etc. to solve real world problems.

PO-5: Understand the impact of IT related solutions in socioeconomic context.

PO-6: Build a strong foundation for research in future & emerging technological trends.

PO-7: Emphasize on life-long learning considering the ever changing technological environment.

PO-8: To develop, a real world application.

PO-9: Understand advanced emerging techniques and to apply there in real world application.

PO-10: Carry on research based project and to develop commercial projects.

(As approved by AC and EC meetings held on 16.08.2023 and 18.04.2023 respectively)



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Scheme of M.Sc. (Information Technology) under Semester System Program Code: MSCITR113

Semester	Course Code	Subject Name	Credit			Total Credit	Marks			
			L	T	P		ESE	IA	Total	
									Max	Min
First	ITT101	Computer System Architecture	3	1	-	4	80	20	100	36
	ITT102	Data Communication and Computer Network	3	1	-	4	80	20	100	36
	ITT103	Object Oriented Programming Using C++	3	1	-	4	80	20	100	36
	ITT104	Operating Systems	3	1	-	4	80	20	100	36
	ITP101	Lab 1: Programming in C++	-	-	2	2	-	-	100	36
	ITP102	Lab 2: Operating System (Unix, Linux & Android)	-	-	2	2	-	-	100	36
	Subtotal			12	4	4	20	-	-	600
Second	ITT201	Relational Database Management System	3	1	-	4	80	20	100	36
	ITT202	Data Structure	3	1	-	4	80	20	100	36
	ITT203	Object Oriented Programming with Java	3	1	-	4	80	20	100	36
	ITT204	Elective-I: Web Technology	3	1	-	4	80	20	100	36
	ITT205	Elective-I: Introduction to Block chain Technology								
	ITT206	Elective-I: Cryptography and Network Security								
	ITP201	Lab 3: Relational Database Management System	-	-	2	2	-	-	100	36
	ITP202	Lab 4: Programming in Java	-	-	2	2	-	-	100	36
	Subtotal			12	4	4	20	-	-	600

Note: Students have to opt one paper from the pool of Elective-I of 2nd Semester, one paper from the pool of Elective-II of 3rd Semester and one paper from the pool of Elective-III of 4th Semester.

Abbreviations used:

ESE: End Semester Exam

IA: Internal Assessment



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Part A: Introduction			
Program: M.Sc. (IT)	Semester: First	Year: I	w.e.f.: 2023-2024
1. Course Code	ITT101		
2. Course Title	Computer System Architecture		
3. Course Type	Theory		
4. Pre-requisite (if any)	No		
5. Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Provide with a deep understanding of the fundamental principles and concepts behind the design and organization of digital computer.• Understand the fundamental concepts of digital computer organization and architecture.• Develop a basic understanding of the building blocks of a digital computer system.• Enable understanding of how these building blocks are organized together to architect a digital computer system.• Enable understanding of how various functional units of a digital computer system interacts to meet the processing requirements of the user.		
6. Credit Value	Theory: 4		
7. Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks:36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Digital Logic Circuit: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits: Adder, Binary Adder, Subtractor, Decoders, Multiplexers, Sequential Circuits: Flip Flops, Registers, Shift Registers, Binary Counters. Data Representation: Data Types, Complements, Fixed Point Representation, Floating Point Representation, Binary Codes.	12
II.	Register Transfer and Micro-operations: Register Transfer Language, register transfer, Bus and Memory Transfer; Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit. Basic Computer Organization: Instruction codes, Stored Program Organization, Computer Registers – Common Bus System; Computer Instructions – Instruction Set Completeness; Instruction Cycle – Fetch and Decode, Determine the Type of Instruction, Register-Reference Instructions; Memory Reference Instructions; Input-Output and Interrupt.	12
III.	Programming the Basic Computer: Machine Language, Assembly Language, Introduction to Assembler, Program Loops, Programming Arithmetic and Logic Operations Micro Programmed Control: Control Memory, Address Sequencing – Conditional Branching, Mapping of Instructions, Subroutines, Micro program Example – Computer Configuration, Microinstruction Format, Symbolic Microinstructions, Fetch Routine, Symbolic Micro program,	12



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	Binary Micro program, Design of Control Unit – Micro program Sequencer.	
IV.	Central Processing Unit: Introduction, General Register Organization, Stack Organization, Evaluation of Arithmetic Expressions, Instruction Formats – Three-, Two-, One- and Zero-Address Instructions, Addressing Modes, Data Transfer and Manipulation, Program Control, Program Interrupt, Types of Interrupt, RISC & CISC Characteristics, Overlap Register Window. Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.	12
V.	Input-Output Organization: Peripheral Devices, Input-Output Interface, Modes of Transfer – Programmed I/O, Interrupt-Driven I/O, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication. Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory, Memory Management Hardware.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. Computer System Architecture, by M. Morris Mano, Third Edition. 2007. Low Price Edition. Pearson Education
2. Computer Architecture and Organization, by John P. Hayes. Third Edition. 2017. McGraw Hill Publication.
3. Computer Organization and Architecture: Designing for Performance, by William Stallings. Tenth Edition. 2016. Pearson Education India.

Reference Books:

1. Computer Organization and Design by David A. Patterson and John L. Hennessy
2. Structured Computer Organization, A. S. Tanenbaum, Pearson Education.
3. Fundamentals of Computer Organization, P. Dandamudi, Springer.
4. Computer Architecture & Parallel processing - Kai Hwang 7 Briggs. (MGH).

E-Resources:

1. **Computer system architecture**
<https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==>
2. **Computer architecture**
https://onlinecourses.nptel.ac.in/noc20_cs25/preview
3. **Computer Architecture free course coursera link**
<https://www.coursera.org/learn/comparch>
4. **Unacademy Computer Architecture Course link**
<https://www.youtube.com/watch?v=zMkye9iaWB4&list=PLG9aCp4uE-s3WzvFW1nI-7hHWNC8s2RdI>








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Part A: Introduction			
Program: M.Sc. (IT)	Semester: First	Year: 1	w.e.f.: 2023-2024
1. Course Code	ITT102		
2. Course Title	Data Communication and Computer Network		
3. Course Type	Theory		
4. Pre-requisite (if any)	No		
5. Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Understand the basic computer network technology• In depth understanding of principals, protocols, technologies of computer network.• Understand and explain the data communication system and its components.• Identify the different types of network topologies and protocols.• Understand the layers of the OSI model and TCP/IP. Expose wireless and wired LANs.		
6. Credit Value	Theory: 4		
7. Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks:36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Overview of Data Communication and Networking: Data Communications: components, data representation, direction of data flow (simplex, half duplex, full duplex; Networks: distributed processing, network criteria, physical structure (type of connection, topology), categories of network (LAN, MAN, WAN), Protocol and standards; Reference Models: OSI & TCP/IP reference model comparative study.	12
II.	Physical layer: Analog and Digital Transmission: Transmission Impairments, Data Rates Limits, Digital to Digital Conversion, Digital to Analog conversion, Analog To Digital Conversion: Modulation, Transmission Modes, Parallel, Serials Asynchronous and Synchronous communication; Constellation Diagram, Analog to Analog conversion, Bandwidth Utilization, Transmission Media: Multiplexing: FDM, WDM AND TDM, Guided Media: Twisted Pair, Coaxial and Fiber Optic, Unguided Media : Wireless , Radio Waves, Microwaves and Infrared.	12
III.	Data Link Layer: Flow control: Protocols: Stop & wait ARQ, Go-Back-N ARQ, Selective repeat ARQ, HDLC; Medium Access Sub-layer: Point to point protocol, LCP, NCP, FDDI, token bus, token ring; Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, FDMA, TDMA, CDMA; Traditional Ethernet, Fast Ethernet.	12
IV.	Network Layer: Networking and Internetworking Devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway; Addressing: Internet address, classful address, subnetting, classless address; Routing: Techniques, static vs dynamic routing, and routing table for classful address; Routing Algorithms: Shortest path algorithm,	12



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	flooding, distance vector routing , link state routing; Protocols: ARP, RARP, IP, ICMP, IPV6; Unicast and multicast routing protocols.	
V.	Transport Layer and Application Layer: UDP, TCP; Congestion control algorithm: Leaky bucket algorithm, Token bucket algorithm, choke packets; Quality of service: techniques to improve QoS, DNS, SMTP, SNMP, FTP, HTTP, World Wide Web (WWW), Domain Name System (DNS), Telnet, Firewalls; Modern Topics: Wireless LAN: IEEE 802.11; Introduction to Bluetooth, VLAN's, Cellular telephony and Satellite network.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. Data Communications and Networking, B. A. Forouzan, TMH, (Latest Edition)
2. Computer Networks, A. S. Tanenbaum, 4th Edition, Pearson Education/PHI
3. Data and Computer Communications, W. Stallings, 5th Edition, PHI/ Pearson Education

Reference Books:

1. Computer Networking – A top down approach featuring the internet, Kurose and Rose, Pearson Education.
2. Communication Networks, Walrand, TMH (Latest Edition)
3. Data and Computer Communication, W. Stallings, 5th Edition, PHI/Pearson Education

E-Resources:

1. NPTEL URL link for Data Communication:
<https://nptel.ac.in/courses/106105082>
2. Introduction to Data Communication From SWAYAM/NPTEL
https://www.youtube.com/watch?v=swtH_okidQc&list=PLUfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=1
3. Layered Architecture
<https://www.youtube.com/watch?v=xHO6LjSHeo0&list=PLUfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=2>
4. Data and Signal
<https://www.youtube.com/watch?v=6ZGVZ7gUccE&list=PLUfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=3>
5. Guided Transmission Media
<https://www.youtube.com/watch?v=y7v3EAsWXA&list=PLUfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=5>
6. Unguided Transmission Media
<https://www.youtube.com/watch?v=hKq1tYIVxdQ&list=PLUfVcb-iqn8dG1-Cn7NTEdILR3hRVgcN&index=6>
7. E-PG Pathshala Link
<https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=iLkSuZZ5a+koxhsE1m+YjQ==>








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Part A: Introduction				
Program: M.Sc. (IT)		Semester: First	Year: 1	w.e.f.: 2023-2024
1.	Course Code	ITT103		
2.	Course Title	Object Oriented Programming Using C++		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	Knowledge of C Programming		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Understand the fundamental programming concepts and methodologies which are essential to create good C++ programs.• Code, test, and implement a well-structured robust computer program using the C++ programming language.• Write reusable modules (collections of functions).• Understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing.• Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms.• Do File handling like Creating/reading/ writing.		
6.	Credit Value	Theory: 4		
7.	Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks:36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Introduction: Procedure-Oriented Programming paradigm, Object-Oriented Programming paradigm, Procedure oriented Vs Object oriented, basic characteristics of OOP's: object class, encapsulation, inheritance, reusability, polymorphism and overloading, static and dynamic binding, message passing, benefits of OOP's and application of OOP's.	12
II.	C++ Basics: Overview, Environment Setup, Basic Syntax, Comments, Basic Data types, Tokens, identifiers, Keywords, Constants/Literals, Variables, Variable Scope, Modifier Types, Storage Classes, Operator, array, pointer and reference variable, I/O statements, namespace, typecasting, control statements: if statement, if- else statement, nested if-else statement, ladder if-else, switch statement, for loop statement, while loop statement, do-while loop statement.	12
III.	Objects and Classes: Basics of object and class and abstract class in C++, private and public members, static data and function members, function prototype, inline functions, friend functions, default arguments, constructors and their types, destructors, friend class. Dynamic allocation operators new and delete.	12



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IV.	Inheritance: Concept of Inheritance, types of inheritance: single, multiple, multilevel, hierarchical, hybrid, protected members, overriding, virtual base class, resolving ambiguity. Polymorphism: function overloading, operator overloading, Pointers in C++, Pointers to objects, this pointer, virtual class, virtual and pure virtual functions.	12
V.	I/O Files and Streams: Concept of streams, cin and cout objects, C++ stream classes, Unformatted and formatted I/O, File stream, C++ File stream classes, File management functions(read(),write(), put(), get(), tellg(), tellp(), seekg(), seekp()).	12
Part C - Learning Resource		
Text Books, Reference Books, E-Resources		
Text Books: <ol style="list-style-type: none">1. E. Balgurusamy, Programming in ANSI C, Tata McGraw-Hill.2. Object oriented Programming with C++, E. Balgurusamy, Tata McGraw-Hill.3. C++ Complete reference, Herbert Schildt, Tata McGraw-Hill.4. Brean W. Kernighan and Dennis M. Ritchie, The C++ Programming Language, Prentice Hall of India.		
E-Resources: <ol style="list-style-type: none">1. SWAYAM Course on Programming in modern C++, https://swayam.gov.in/explorer?searchText=C%2B%2B+Programming2. SWAYAM Course on C and C++ https://onlinecourses.swayam2.ac.in/aic20_sp06/preview3. SWAYAM Course on C/C++ - Hindi https://onlinecourses.swayam2.ac.in/aic20_sp43/preview4. SWAYAM Course on Advanced C++ https://onlinecourses.swayam2.ac.in/aic20_sp01/preview		








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Part A: Introduction				
Program: M.Sc. (IT)		Semester: First	Year: 1	w.e.f.: 2023-2024
1.	Course Code	ITT104		
2.	Course Title	Operating Systems		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	No		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Describe the importance of computer system resources and the role of operating system in their management policies and algorithms.• Understand various functions, structures and history of operating systems and should be able to specify objectives of modern operating systems and describe how operating systems have evolved over time.• Understanding of design issues associated with operating systems.• Understand various process management concepts including scheduling, synchronization, and deadlocks.• Have a basic knowledge about multithreading.• Understand concepts of memory management including virtual memory.• Have sound knowledge of various types of operating systems including Unix and Android.• Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve.		
6.	Credit Value	Theory :4		
7.	Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks:36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Introduction to Operating System: What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch Operating Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control and Real time Systems.	12
II.	Operating System Organization and Process Characterization: Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Preemptive and Preemptive Scheduling Algorithms.	12



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III.	Inter Process Communication and Synchronization: Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer problem, Reader-Writer problem. Deadlock: Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.	12
IV.	Memory Management: Physical and Virtual Address Space; Memory Allocation Strategies- Fixed and Variable Partitions, Paging, Segmentation, Virtual Memory: Demand Paging, Page Replacement, Page replacement Algorithms, Performance of Demand Paging, Allocation of Frames, Thrashing,	12
V.	Introduction to Android Operating System: Introduction to Android Operating System, Android Development Framework, Android Application Architecture, Android Process Management and File System, Small Application Development using Android Development Framework.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2. W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.

Reference Books:

1. A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
2. G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
3. M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

E-Resources:

1. **SWAYAM/NPTEL - IITD**
<https://youtube.com/playlist?list=PLsYlUObW5M3CAGT6OdubyH6FztKfJCcFB>
2. **NPTEL - IIT Madras**
https://youtube.com/playlist?list=PL3-wYxht4yCjpcfUDz-TgD_ainZ2K3MUZ
3. **Coursera:** Introduction: <https://www.coursera.org/specializations/codio-introduction-operating-systems?>
4. **Memory Management:**
<https://www.coursera.org/learn/codio-intro-to-operating-systems-2-memory-management?specialization=codio-introduction-operating-systems>








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Part A: Introduction			
Program: M.Sc. (IT)	Semester: First	Year: 1	w.e.f.:2023-2024
1.	Course Code	ITP101	
2.	Course Title	LAB 1: Programming in C++	
3.	Course Type	Practical	
4.	Pre-requisite (if any)	Theoretical knowledge of C	
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Understand the fundamental programming concepts and methodologies which are essential to create good C++ programs.• Code, test, and implement a well-structured robust computer program using the C++ programming language.• Write reusable modules (collections of functions).• Understand design/implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing.• Develop an in-depth understanding of functional, logic, and object-oriented programming paradigms.	
6.	Credit Value	2	
7.	Total Marks	External Marks: 100	Min Passing Marks:36

Part B: Content of the Course	
Total Hours: 60	
Tentative Practical List	Note: Following is tentative list of programs the teachers concerned can add more programs as per requirement. <ol style="list-style-type: none">1. WAP to print the sum and product of digits of an integer.2. WAP to reverse a number.3. WAP to compute the sum of the first in terms of the following series $S=1+1/2+1/3+1/4+...$4. WAP to compute the sum of the first in terms of the following series $S=1-2+3-4+5.....$5. Write a function that checks whether a given string is Palindrome or not. Use this function to find whether the string entered by the user is Palindrome or not.6. Write a function to find whether a given no. is prime or not. Use the same to generate the prime numbers less than 100.7. WAP to compute the factors of a given number.8. Write a macro that swaps two numbers. WAP to use it.9. WAP to print a triangle of stars as follows (take number of lines from user):10. WAP to perform following actions on an array entered by the user:



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- i. Print the even-valued elements.
- ii. Print the odd-valued elements.
- iii. Calculate and print the sum and average of the elements of the array.
- iv. Print the maximum and minimum element of the array.
- v. Remove the duplicates from the array.
- vi. Print the array in reverse order

The program should present a menu to the user and ask for one of the options. The menu should also include options to re-enter the array and to quit the program.

11. WAP that prints a table indicating the number of occurrences of each alphabet in the text entered as command line arguments.
12. Write a program that swaps two numbers using pointers.
13. Write a program in which a function is passed an address of two variables and then alter its contents.
14. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
15. Write a program to find the sum of n elements entered by the user. To write this program, allocate memory dynamically using malloc() / calloc() functions or new operators.
16. Write a menu driven program to perform following operations on strings:
 - a) Show address of each character in string
 - b) Concatenate two strings without using string function.
 - c) Concatenate two strings using string function.
 - d) Compare two strings.
 - e) Calculate length of the string (use pointers).
 - f) Convert all lowercase characters to uppercase.
 - g) Convert all uppercase characters to lowercase.
 - h) Calculate number of vowels.
 - i) Reverse the string.
17. Given two ordered arrays of integers, write a program to merge the two arrays to get an ordered array.
18. WAP to display Fibonacci series
 - (i) using recursion
 - (ii) using iteration.
19. WAP to calculate Factorial of a number
 - (i) using recursion
 - (ii) using iteration.
20. WAP to calculate GCD of two numbers (i) with recursion (ii) without recursion
21. Create a Matrix class using templates. Write a menu-driven program to perform following Matrix Operations (2-D array implementation):
 - a) Sum
 - b) Difference
 - c) Product
 - d) Transpose
22. Create the Person class. Create some objects of this class (by taking



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	<p>information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).</p> <p>23. Create a class Triangle. Include overloaded functions for calculating areas. Overload assignment operator and equality operator.</p> <p>24. Create a class Box containing length, breadth and height. Include following methods in it:</p> <ol style="list-style-type: none">Calculate surface AreaCalculate VolumeIncrement, Overload++ operator (both prefix & postfix)Decrement, Overload - operator (both prefix & postfix)Overload operator= (to check equality of two boxes), as a friend functionOverload Assignment operatorCheck if it is a Cube or cuboid Write a program which takes input from the user for length, breadth and height to test the above class. <p>25. Create a structure Student containing fields for Roll No., Name, Class, Year and Total Marks. Create 10 students and store them in a file.</p> <p>26. Write a program to retrieve the student information from file created in previous question and it in following format:</p> <table style="margin-left: 40px;"><tr><td>Roll No.</td><td>Name</td><td>Marks</td></tr></table> <p>27. Copy the contents of one text file to another file, after removing all whitespaces.</p> <p>28. Write a function that reverses the elements of an array in place. The function must accept only one pointer value and return void.</p>	Roll No.	Name	Marks
Roll No.	Name	Marks		

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

- E. Balgurusamy, Programming in ANSI C, Tata McGraw-Hill.
- Object oriented Programming with C++, E. Balgurusamy, Tata McGraw-Hill.
- C++ Complete reference, Herbert Schildt, Tata McGraw-Hill.
- Brean W. Kernighan and Dennis M. Ritchie, The C++ Programming Language, Prentice Hall of India.

E-Resources:

- SWAYAM Course on Programming in modern C++,
<https://swayam.gov.in/explorer?searchText=C%2B%2B+Programming>
- SWAYAM Course on C and C++
https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
- SWAYAM Course on C/C++ - Hindi
https://onlinecourses.swayam2.ac.in/aic20_sp43/preview
- SWAYAM Course on Advanced C++
https://onlinecourses.swayam2.ac.in/aic20_sp01/preview








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Part A: Introduction			
Program: M.Sc. (IT)	Semester: First	Year: 1	w.e.f.: 2023-2024
1.	Course Code	ITP102	
2.	Course Title	LAB 1: Operating System (Unix, Linux & Android)	
3.	Course Type	Practical	
4.	Pre-requisite (if any)	Theoretical knowledge of Java	
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Implement various functions of operating system using java program.• Implement CPU scheduling algorithms programmatically.• Understand kernel and shell.• Understanding basic commands to operate Unix/Linux.• Explore various flavours of Linux Operating System.• Writing shell scripting.• Explore android Environment• Develop android based application.	
6.	Credit Value	2	
7.	Total Marks	External Marks: 100	Min Passing Marks:36

Part B: Content of the Course	
Total Hours: 60	
Tentative Practical List	<p>Note: Following is tentative list of programs the teachers concerned can add more programs as per requirement.</p> <ol style="list-style-type: none">1. Process Management:<ul style="list-style-type: none">• Create a C++ program to demonstrate the creation of a new process using fork() system call.• Implement a program to show the usage of exec() family system calls to execute different programs.• Write a C++ program to simulate the producer-consumer problem using multithreading and synchronization mechanisms like semaphores.2. Memory Management:<ul style="list-style-type: none">• Create a C++ program to implement a simple dynamic memory allocator using explicit free list approach.• Write a program to demonstrate the concept of virtual memory by implementing a simple demand-paging system.3. Scheduling Algorithms:<ul style="list-style-type: none">• Write a C++ program to implement the First-Come-First-Serve (FCFS) scheduling algorithm for a set of processes.• Create a program to simulate the Round Robin (RR) scheduling algorithm with a given time quantum.4. Unix Operating System:<p>Getting familiar with the Unix environment, Logging in and logging out, Understanding the Unix file system structure, Navigating directories (ls, cd, pwd) Creating, copying, moving, and deleting files and directories (mkdir,</p>



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	<p>cp, mv, rm) Viewing and editing files (cat, less, head, tail, vi), Redirecting input and output (>, >>, <) Combining and splitting files (cat, split), Archiving files (tar, gzip, zip).</p> <p>5. Understanding file permissions: chmod, chown, chgrp, Managing processes (ps, top, kill, jobs) Running processes in the background (bg, fg, Ctrl + Z, Ctrl + C) Using basic process control commands (nice, renice).</p> <p>6. Introduction to shell scripting: Creating and running shell scripts, Using variables and basic data types Conditional statements (if, else, elif), Looping constructs (for, while).</p> <p>7. Introduction to Android OS and its architecture: Setting up the development environment (Android Studio, SDK, AVD Manager) Creating a new Android project, Understanding the project structure and resources.</p> <p>8. User Interface Design: Working with XML layout files (Relative Layout, Linear Layout, Constraint Layout, etc.) Adding UI elements (TextView, EditText, Button, ImageView, etc.) Handling user input and events (OnClickListener, OnLongClickListener, etc.).</p>
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Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. E. Balgurusamy, Programming in ANSI C, Tata McGraw-Hill.
2. Object oriented Programming with C++, E. Balgurusamy, Tata McGraw-Hill.
3. C++ Complete reference, Herbert Schildt, Tata McGraw-Hill.
4. Brian W. Kernighan and Dennis M. Ritchie, The C++ Programming Language, Prentice Hall of India.
5. UNIX and Linux System Administration Handbook by Evi Nemeth, Garth Snyder, Trent R. Hein, and Ben Whaley.
6. Android Programming: The Big Nerd Ranch Guide by Bill Phillips, Chris Stewart, and Kristin Marsiano:

Reference Books:

1. UNIX: The Textbook by Syed Mansoor Sarwar, Robert Koretsky, and Syed Aqeel Sarwar:
2. UNIX in a Nutshell by Arnold Robbins and Nelson H. F. Beebe:
3. Head First Android Development by Dawn Griffiths and David Griffiths:
4. Android Studio 4.0 Development Essentials by Neil Smyth:

E-Resources:

1. Linux Fundamentals
https://onlinecourses.swayam2.ac.in/aic20_sp24/preview
2. Unix System Basics
<https://www.coursera.org/learn/codio-unix-system-basics>
3. SWAYAM Course on Programming in modern C++,
<https://swayam.gov.in/explorer?searchText=C%2B%2B+Programming>
4. SWAYAM Course on C and C++
https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
5. SWAYAM Course on C/C++ - Hindi
https://onlinecourses.swayam2.ac.in/aic20_sp43/preview
6. SWAYAM Course on Advanced C++
https://onlinecourses.swayam2.ac.in/aic20_sp01/preview








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Part A: Introduction			
Program: M.Sc. (IT)	Semester: Second	Year: 1	w.e.f.: 2023-2024
1. Course Code	ITT201		
2. Course Title	Relational Database Management System		
3. Course Type	Theory		
4. Pre-requisite (if any)	No		
5. Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Learn about Database Concepts, Architecture, various Users, Data Models and Data Management which helps them to interact with various Databases.• Develop various Tables and Databases which helps them to develop new Software.• Practice various SQL commands which help them to generate new relationships among various Tables and Databases which are useful for Software Development.• Make familiar about RDBMS Software like Oracle and SQL Server which are used as Backend for Software Development.• Develop new Databases for their Minor and Major Project.• Development which enhances their Data Storage, Data Accessibility and Data Management.		
6. Credit Value	Theory: 4		
7. Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks : 36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Overview of Database Management: Data, Information and Knowledge, Data Processing versus Data Management, File Oriented Approach versus Database Oriented Approach, Data Independence, Database Administration Roles, Overview of Database, DBMS Architecture, Different kinds of DBMS users, Introduction to Data Dictionary, Data Models: Network Model, Relational Model, Hierarchical Model. Database Languages: DDL, DML, DCL, And TCL. Structured Query Language: Basic Data Types, Commands: Create, Insert, Select, Delete, Truncate, Drop, Alter, Grant, Revoke, Commit, Rollback, Queries on Multiple Relation, Join Operations, String Operations, Set Operations, Grouping, Nested Sub queries.	12
II.	Concepts of Database Management System: Definition of Tables, Cardinality relationships in a Database, Constraints in a Database, Entity, Attributes, Strong and weak entities, ER-Diagram, Symbols and Implementation, Concept of keys: Candidate key, Primary key, Alternate key, Foreign key, Case studies of ER modeling Generalization, Specialization and Aggregation. Converting an ER model into relational Schema.	12



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III.	Relational Database Design: Normalization concept in logical model, Pitfalls in database design, Functional dependencies, Join dependencies, Natural Join, Normal forms (1NF, 2NF, 3NF). Boyce-Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. De-normalization. Relational Database, Structure of Relational Database, Schema, Relational Operation : Selection, Projection, Cartesian Production, Union, Intersection and Minus operation .Relational Algebra: Select operation, Project operation, Union operation, Cartesian Product operation, Intersection operation, Join operation, Different types of joins (Inner join, Outer join, Self join).	12
IV.	Transaction Processing: ACID Properties of Transactions, Concurrency control, Transaction support in SQL, Locking Techniques. Database recovery techniques - Shadow paging, Log Based Recovery, ARIES recovery algorithm, Database Security, Deadlock: Detection, Avoidance and Recovery.	12
V.	DBMS Software's: Oracle, SQL Server and MySQL- Oracle, SQL Server and MySQL Installation, Features of this software's, Database creation, Backup and restore. Implementation of SQL: Data Definition Language (DDL) Commands, Data Manipulation Language (DML) Commands, Data Control Language (DCL) Commands, Transaction Control Language (TCL) Commands, Data Constraints, Introduction to PL/SQL Programming, Data Types, Looping Statements, Cursors, Stored Procedure, Function ..	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. Database system concept, H. Korth and A. Silberschatz, TMH Publications.
2. Data Base Management System, Alexies & Mathews, Vikash publication.
3. Data Base Management System, C. J. Date ,Narosha Publication.
4. Data Base Management System By James Matin.

Reference Books:

1. Principles of Database System By Ullman.
2. Program Design, Peter Juliff, PHI Publications.
3. The Complete Reference, Kevin Loney, Oracle Press.
4. SQL, PL/SQL The Programming Language of Oracle, Ivan Bayross, Pustak Kosh Publication.
5. Microsoft SQL Server Management and Administration, Ross, STM Publications.

E Resources:

1. SWAYAM URL link for DBMS and RDBMS: <https://youtu.be/f6LGtJutWyA>
2. SWAYAM URL link for DBMS and RDBM: <https://youtu.be/IoL9Ve2SRwQ>
3. SWAYAM URL link for DBMS and RDBMS: <https://swayam.gov.in/courses/4434-data-base-management-system>.
4. Introduction of DBMS: https://onlinecourses.swayam2.ac.in/cec19_cs05/preview
5. Introduction of RDBMS: https://onlinecourses.nptel.ac.in/noc19_cs46/preview
6. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==>
7. <https://www.coursera.org/learn/introduction-to-relational-databases>








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Part A: Introduction				
Program: M.Sc. (IT)		Semester: Second	Year: 1	w.e.f.: 2023-2024
1.	Course Code	ITT202		
2.	Course Title	Data Structure		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	No		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Use different types of data structures, operations and algorithms.• Implement appropriate sorting/searching technique for any given problem.• Use stack, Queue, Lists, Trees and Graphs in problem solving.• Find suitable data structure during application development/ Problem Solving.• Understand complex data structure like B+ Tree, Graph and use this structure in problem solving.		
6.	Credit Value	Theory: 4		
7.	Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks : 36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Introduction and Basic Concepts of Data Structure: Data types: primitive, non-primitive data types, ADT, Linear and nonlinear data structure. Linear Data Structures: Arrays: One dimensional, Multidimensional array, allocation methods, address calculations, sparse arrays. Linked List: Singly and Doubly Linear link lists, singly and doubly circular linked list: Definitions, operations (INSERT, DELETE, TRAVERSE) on these lists. (Insertion operation includes – insertion before a given element, insertion after a given element, insertion at given position, insertion in sorted linked list).	12
II.	Stack: Definition, Operations: PUSH, POP, TRAVERSE, implementations using array and linked list, Applications of stack: Infix, Prefix, Postfix representation and conversion using stack, Postfix expression evaluation using stack. Queue: Introduction, and Types of Queues: Priority Queue, Circular queue, Double Ended Queue, operations (INSERT, DELETE, TRAVERSE), implementation using array and linked list and applications.	12



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III.	Non-linear Data Structure: Trees: Definition of trees and their types, Binary trees, Properties of Binary trees and Implementation, operations (Insertion, deletion, searching and traversal algorithm: preorder, post order, in-order traversal), Binary Search Trees, Implementations, Threaded trees, AVL Trees.	12
IV.	Graph: Definition of Graph and their types, adjacency and incident matrices and linked list representation of graphs, Graph Traversal – Breadth first Traversal, Depth first Traversal, Connectivity of graphs; Weighted Graphs, Shortest path Algorithm, spanning tree, Minimum Spanning tree, Kruskal's and prim's algorithms. Static Hashing: Introduction, Hash table, Hash function.	12
V.	Sorting Methods: Types of sorting, Selection Sort, Insertion Sort, Bubble Sort, Quick Sort, Merge Sort, Radix Sort. Searching: Linear search, Binary search, Hashing, collision Resolution methods, Comparison of Search trees.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Book:

1. Fundamentals of Data Structures, Horowitz and Sahani, Computer Science Press, 1978
2. Data structure Through C, G. S. Baluja, Dhanpat Rai And Co.
3. Data Structure, Seymour Lipschutz, Schaum's Outline Series

Reference Books:

1. Data Structures and Algorithms in C++, Michael T. Goodrich, Wiley, 2007
2. Data structures and Algorithms, Aefred V. Aho, Jhon E. Joperoft and J.E. Ullman.
3. An Introduction to Data Structures with Applications, Jean Paul Trembley and Paul Sorenson, TMH, International Student Edition, 1985
4. Data Structures and Program Design in C, R. Kurse, Leung & Tondo, 2nd Edition, PHI publication

E Resources:

1. <https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=fBYckQKJvP3a/8Vd3L08tQ==>
2. <https://www.coursera.org/learn/data-structures>
3. SWAYAM Link https://onlinecourses.swayam2.ac.in/cec19_cs04/preview
4. SWAYAM course on Programming, Data Structures And Algorithms Using Python-
https://onlinecourses.nptel.ac.in/noc23_cs95/preview
5. SWAYAM course on Data Structures
https://onlinecourses.swayam2.ac.in/cec22_cs10/preview
6. SWAYAM course on Data Structures
https://onlinecourses.swayam2.ac.in/cec23_cs09/preview








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Part A: Introduction			
Program: M.Sc. (IT)	Semester: Second	Year: 1	w.e.f.: 2023-2024
1. Course Code	ITT203		
2. Course Title	Object Oriented Programming with Java		
3. Course Type	Theory		
4. Pre-requisite (if any)	Knowledge of C/C++		
5. Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Develop programming skill and learn how to implement new Platform Independent software.• Develop new Packages which help them to develop new application software and Utility Software.• Develop new Online Software and Internet Games with the help of Applet and AWT Packages.• Learn about TCP/IP Client and Server Sockets which helps them to develop Networking Software• Familiar about Applet, Thread and Servlet Life Cycle which helps them to develop value added services for Internet Users.• Learn about new Integrated Development Environment and new Web servers.		
6. Credit Value	Theory: 4		
7. Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks:36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Overview of JAVA: The genesis of java, History of java, Java Virtual Machine (JVM), Java development kit (JDK), Source Files, Jar Files, Compiling and Running of Files, Byte Code, Platform Independency, Data types, Literals, Variables, Constants, Array and it's types, Operators, Conditional and looping statements, various packages, Introduction of class, objects and methods, nested and inner class, string handling, constructor, writing simple JAVA program.	12
II.	Inheritance, Packages and interface- Concept of super and sub class, types of inheritance, access specifiers, Method Overriding, Abstract Class, Constructor in Multilevel Inheritance, using final with Inheritance. Package: Defining package, Rules for creating a new Package, CLASSPATH, Access protection, Importing Package. Interface: Defining and Implementing Interface, extending interface, nested interface, importance of interface in Java.	12



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III.	Exception Handling and Multithreading: Using try and catch, multiple catch classes, Nested try statements, throw, throws and finally, Built in Exception, Uncaught Exception, Creating own Exception class. Java Thread Model: Main thread, Creating own Thread, Life cycle of thread, Thread priorities, Synchronization, Interthread Communication, Suspending, Resuming and Stopping thread.	12
IV.	Java Packages: I/O classes: Byte Stream and Character Stream, Predefined Stream, reading console input, writing console output. Applet: Applet Life Cycle, Creating an applet, Using image and sound in applet. Lang: Various classes, Importance class Definition, Util: Framework, Event Model, Scanner Class AWT: Exploring AWT, Event handling – The delegation-event model, Event classes, Source of event, Event listener interfaces ,handling mouse and keyboard event ,Adapter class Networking: classes and interface ,Socket, TCP/IP Client Socket and Server Socket, URL Connection.	12
V.	Server site programming and database connectivity: Servlet – Overview of Servlet, Life cycle of servlet, JAVA servlet architecture , Generic servlet and http servlet ,The servlet interface, Request and response Integrated Development Environment: Eclipse IDE, Netbeans IDE, Web Servers: Apache Tomcat Web Server, JBoss Server Database Connectivity: JDBC API, Basic Connectivity with Oracle and SQL Server.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. The complete reference, Naughton P and Schildt H., Osborne , McGraw-Hill, Berkeley Publication.
2. Java Programming, By E.Balgurusamy, McGraw-Hill Publication.

Reference Books:

1. An Introduction to JAVA programming, James R. Levenick ,Firewall Media publication.
2. Core JAVA for beginners, Rashmi KantaDas ,Vikas Publication.
3. Java beginners Guide, Herbert Schildt, McGraw-Hill Publication.

E-Resources:

1. SWAYAM URL link for Java : https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
2. SWAYAM URL link for Java : https://onlinecourses.nptel.ac.in/noc19_cs84/preview
3. SWAYAM URL link for Java : <https://www.dqindia.com/iit-bombay-offers-free-online-course-java-swayam-platform/>
4. SWAYAM URL link for Java : <https://www.classcentral.com/course/swayam-programming-in-java-12930>
5. Coursera URL Link for Java : <https://www.coursera.org/specializations/core-java>
6. Udemy URL Link for Java: <https://www.udemy.com/course/java-development-for-beginners-learnit/>








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Part A: Introduction				
Program: M.Sc. (IT)		Semester: Second	Year: 1	w.e.f.: 2023-2024
1.	Course Code	ITT204		
2.	Course Title	Elective-I: Web Technology		
3.	Course Type	Theory		
4.	Pre-requisite (if any)	No		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">Analyze a web page and identify its elements and attributes.Create web pages using HTML, CSS, JAVASCRIPT, XHTMLBuild dynamic web pages using JavaScript (Client side programming).Create XML documents and Schemas.Build interactive web applications using, PHP, AJAX. Learn Web Hosting and Deployment.		
6.	Credit Value	Theory: 4		
7.	Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks:36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Introduction :Introduction to web, Introduction to Internet, WWW, Web Browsers, Web Servers, URL, Multipurpose Internet Mail Extensions, protocols governing the web, web development strategies, Web Design Principles and Web site structure ,Web applications, Introduction to Web Publishing: Introduction, Domain name and hierarchy, Domain Name Registration .	12
II.	HTML : Introduction, Basic formatting tags: heading, paragraph, line break, bold, italic, underline, superscript, subscript, font and image. Different attributes like align, color, bgcolor, font face, border, size. Navigation Links using anchor tag: internal, external, mail and image links; Link to different web pages and sections. Lists: ordered, unordered and definition, Table tag, HTML Form controls: form, text, password, text area, button, checkbox, radio button, select box, hidden controls, Frameset and frames. Basics of DHTML , XML.	12
III.	Scripting Languages : Usefulness of Style Sheets, Creating Style sheets, Classes and Pseudo Classes, CSS Tags, Background, Font, Text, Position etc. JavaScript: Overview, Syntax & Conventions, Variables, Expression, Branching & Looping, Function, Array, Objects, Events & Document Object model, Alerts, prompts and	12



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	conforms.	
IV.	PHP: Introduction to PHP, Server side scripting, Role of Web Server software, including files, comments, variables and scope, echo and print, Operators: Logical, Comparison and Conditional operators, Branching statements, Loops, break and continue PHP functions. Passing information between pages, HTTP GET and POST method, String functions: strlen, strpos, strstr, strpos, substr, str_replace, string case, Array constructs: array(), list() and foreach(), PHP advanced functions: Header, Session, Cookie, Object Oriented Programming using PHP: class, object, constructor, destructor and inheritance.	12
V.	Web Hosting and Deployment: Introduction to Webhosting, WordPress : Introduction to CMS And WordPress Why CMS Advantages and Disadvantages of CMS, WordPress Installation, User Administration, WordPress Themes, Working with Widgets Working with Menu for Website. Web Deployment, XAMPP, Configuring DHCP, IIS and DNS Server.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. Xavier, C, "Web Technology and Design", New Age International.
2. Ivan Bayross, "HTML, DHTML, Java Script, Perl & CGI", BPB Publication.
3. Ramesh Bangia, "Internet and Web Design", New Age International.
4. Ullman, "PHP for the Web: Visual Quick Start Guide", Pearson Education.
5. Jim Converse & Joyce Park, "PHP & MySQL Bible", Wiley India Publication
6. Raj Kamal, "Internet and Web Technologies", Tata McGraw-Hill.

Reference Books:

1. Internet and Internet Engineering, Daniel Minoli, TMH.
2. Chuckmusiano & Bill Kenndy, O Reilly, HTML The Definite Guide"
3. Joseph Schmuller, Dynamic HTML, BPB, 2000.
4. Deitel, Deitel, Goldberg, "Internet & World Wide Web How to Program", Third Edition, Pearson Education, 2006.

E-Resources:

1. https://onlinecourses.swayam2.ac.in/aic20_sp11/preview
2. <https://www.coursera.org/learn/introduction-to-web-development-with-html-css-javascript?action=enroll&adgroupid=154709125594&adposition=&campaignid=20395923513&creativeid=667061327480&device=c&devicemodel=&gclid=Cj0KCCQjw2qKMBhCfARIsAFy8buKxIYam7tWtPzSQ46fXKZcqBmupu3gKrwgxmSmbwdtKTLNiZCkYtqg>



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3. https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000007CS/P001071/M017403/ET/1473335362etext-Module6.pdf

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Part A: Introduction			
Program: M.Sc. (IT)	Semester: Second	Year: 1	w.e.f.: 2023-2024
1. Course Code	ITT205		
2. Course Title	Elective-I: Introduction to Blockchain Technology		
3. Course Type	Theory		
4. Pre-requisite (if any)	A sound knowledge of data structure and programming		
5. Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Understand block chain technology.• Understand Cryptocurrency.• Understand Smart contract.• Develop block chain based solutions and write smart contract using Ethereum Framework.• Deploy Decentralized Application.		
6. Credit Value	Theory: 4		
7. Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks: 36	

Part B: Content of the Course		
Unit	Topics	Total Hours
I.	Introduction: Overview of Block chain, History of Blockchain, Peer to Peer Network, Smart Contract, Wallet, Digital Currency, Ledgers, Types of Block chain Platforms. Characteristics, Limitations and applications of Blockchain technology.	12
II.	Consensus Mechanism: Permissioned Blockchain, Permission less Blockchain, Different Consensus Mechanism- Proof of Work, Proof of Stake, Proof of Activity, Proof of Burn, Proof of Elapsed Time, Proof of Authority, Proof of Importance.	12
III.	Crypto currency and Wallet: Types of Wallet, Desktop Wallet, App based Wallet, Browser based wallet, MetaMask, Creating an account in MetaMask, Use of faucet to fund wallet, transfer of cryptocurrency in MetaMask. Smart contract and Ethereum: Overview of Ethereum, Writing Smart Contract in Solidity, Remix IDE, Different networks of ethereum, understanding blocks, how to compile and deploy smart contract in remix.	12
	Understanding Hyperledger Fabric: Overview of Open source	12



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IV.	Hyperledger project, Hyperledger Fabric- Architecture, Identities and Policies, Membership and Access Control, Channels, Transaction Validation, Writing smart contract using Hyperledger Fabric.	
V.	Use Cases: Enterprise application of Block chain: Cross border payments, Know Your Customer (KYC), Food Security, Block chain enabled Trade, We Trade – Trade Finance Network, Supply Chain Financing, Identity on Block chain, Blockchain in energy sector, Blockchain in governance.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin. and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).
2. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies.

Reference Books:

1. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System.
2. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger," Yellow paper.2014.
3. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts.
4. Melanie Swan, Blockchain: Blueprint for a New Economy.
5. Imran Bashier, Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks.
6. Andrews, Mastering Ethereum: Building Smart Contracts and DApps.

E-Resources:

1. Swayam/NPTEL: https://onlinecourses.swayam2.ac.in/aic21_ge01/preview
2. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs01/preview
3. edX: <https://www.edx.org/course/blockchain-technology>
4. Coursera: <https://www.coursera.org/search?query=Blockchain&>
5. Hyperledger Fabric: <https://www.youtube.com/watch?v=GWoN9TwbM20>
6. Case studies of Blockchain: <https://www.youtube.com/watch?v=GTEExtIjIE7I>
7. <https://www.youtube.com/watch?v=fhWjGs-2PLE&list=PLkkt2qQlhbKYLQ1fFKXHmw64QfC9bRz2G>








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Part A: Introduction

Program: M.Sc. (IT)	Semester: Second	Year: 1	w.e.f.: 2023-2024
1. Course Code	ITT206		
2. Course Title	Elective-I: Cryptography and Network Security		
3. Course Type	Theory		
4. Pre-requisite (if any)	Basic knowledge of networking and algorithms		
5. Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Classify the symmetric encryption techniques.• Illustrate various Public key cryptographic techniques.• Evaluate the authentication and hash algorithms.• Summarize the intrusion detection and its solutions to overcome the attacks.• Understand basic concepts of system level security.		
6. Credit Value	Theory: 4		
7. Total Marks	Internal Marks: 20 External Marks: 80	Min Passing Marks:36	

Part B: Content of the Course

Unit	Topics	Total Hours
I.	Classical Encryption Technique: Basics of computer network, TCP/IP model, Foundations of Cryptography and security trends, Secret key vs public key cryptography, Symmetric cipher model, substitution techniques, Transportation techniques, Mathematical tools for cryptography: modular arithmetic, Euclidean algorithm, finite fields, polynomial arithmetic.	12
II.	Symmetric Cipher: Symmetric cipher model, Traditional block cipher: Stream and block cipher, Feistel cipher network structure, Design Principles of Block Ciphers, Data Encryption Standard (DES), Strength of DES, Triple DES, Block cipher design principle, Block cipher operation, Advance encryption Standard (AES), Evaluation criteria of AES, AES transformation function, key distribution.	12
III.	Public Key cryptography and Hash Function: Principles of public key cryptosystem, Requirement, RSA algorithm. Hash function, Key management: Diffie-Helman Key exchange, Man in the middle attack, elliptic curve arithmetic, elliptic curve cryptography, Application of cryptographic hash function, Hash and Message authentication Code (MAC), Hash and MAC algorithms, MAC based on hash function, Digital signature and Authentication protocol. Key management and distribution: Distribution of	12



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	symmetric key and public key, Public key Infrastructure (PKI).	
IV.	IP and Web security protocols: User authentication: principle, Remote user authentication using symmetric and asymmetric encryption, Kerberos, E-mail security: Pretty Good Privacy (PGP), S/MIME, IP security: IPsec, transport layer Security: Secure Socket layer (SSL), Secure Electronic Transaction (SET).	12
V.	Network Security and Management: Principles of cryptography, Authentication, integrity, key distribution and certification, Access control and Firewalls, attacks and counter measures, security in many layers. Infrastructure for network management, The internet standard management framework, SMI, MIB, SNMP, Security and administration.	12

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. Cryptography and Network Security, William Stallings, 4th Edition Pearson Publication.
2. Network security and cryptography, Bernard Menezes, Cenage Learning India Pvt. Ltd. First edition 2010.

Reference Books:

1. Applied cryptography - protocols and algorithm, Bruce Schneier, Springer Verlag 2003.
2. Cryptography and Network Security, Atul Kahate, TMH Publication.
3. Cryptography and Network Security, Behrouz A. Forouzan, First Edition, TMH Publication.
4. Network Security: Private Communication in Public World By Charlie Kaufman, Radia Perlman and Mike Speciner, PHI Publication.

E-Resources:

1. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs21/preview
2. Swayam/NPTEL: https://onlinecourses.nptel.ac.in/noc20_cs02/preview
3. Coursera: <https://www.coursera.org/search?query=Cryptography>
4. Coursera: <https://www.coursera.org/search?query=network%20security&>
5. https://www.vssut.ac.in/lecture_notes/lecture1428550736.pdf
6. <http://www.anuraghyd.ac.in/cse/wp-content/uploads/sites/10/NS-CRYPTO-LAB-Final11.pdf>
7. <https://www.vvitengineering.com/lab/odd/CS6711-Security-Lab-Manual.pdf>
8. <https://www.vidyarthiplus.com/vp/attachment.php?aid=53300>
9. <https://kgr.ac.in/storage/2021/08/CNS-LAB-Manual.pdf>








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Part A: Introduction

Program: M.Sc. (IT)		Semester: Second	Year: 1	w.e.f.:2023-2024
1.	Course Code	ITP201		
2.	Course Title	LAB 3: Relational Database Management System		
3.	Course Type	Practical		
4.	Pre-requisite (if any)	Basic Knowledge of SQL		
5.	Course Learning Outcomes (CLO)	At the end of this course, Students will be able to: <ul style="list-style-type: none">• Learn about Database Concepts, Architecture, various Users, Data Models and Data Management which helps them to interact with various Databases.• Develop various Tables and Databases which helps them to develop new Software.• Practice various SQL commands which help them to generate new relationships among various Tables and Databases which are useful for Software Development.• Become familiar about RDBMS Software like Oracle and SQL Server which are used as Backend for Software Development.• Develop new Databases for their Minor and Major Projects.		
6.	Credit Value	2		
7.	Total Marks	External Marks: 100	Min Passing Marks:36	

Part B: Content of the Course

Total Hours: 60

Tentative Practical List	<p>Note: Following is tentative list of programs the teachers concerned can add more programs as per requirement.</p> <ol style="list-style-type: none">1. Design an employee table in Oracle/SQL Server having eid (primary key) ename, edesignation, edoj, edob, eaddress, salary, econtact as fields and answer the following questions :<ol style="list-style-type: none">a) Insert five records in above created table.b) Display all five records.c) Delete the fourth record.d) Update the third record of field ename as 'hari'.e) Add one new field in the table.2. Design a salary table Oracle/SQL Server with one primary key and foreign key(employee table) having following fields : Month, working days, deptid, gross, incentive, deduction and net salary.<ol style="list-style-type: none">a) Insert five records in above created table.b) Display all five records.c) Use foreign key relation and display records.d) Update the second record of field deptid as 'Sales'.e) Add one new field in the table.3. Create a new user in Oracle/SQL Server.
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4. Create a view in Oracle/SQL Server.
5. Create a new table in Oracle/SQL Server and practice for join operation.
6. Create a new user in Oracle/SQL Server and practice for commit and rollback command.
7. Create a new database in Oracle/SQL Server having at least five tables for Hotel Management System.
8. Create a new database in Oracle/SQL Server having at least four tables for Covid Vaccination Management System.
9. Create a new database in Oracle/SQL Server having at least five tables for Library Management System.
10. Create a new table in Oracle/SQL Server and practice for Group by and Order by Clause.
11. Create a new table in Oracle/SQL Server and practice for max(), min(), avg() and count() functions.
12. Create a new table in Oracle/SQL Server and practice for lower(), substr(),trim() and upper() functions.
13. Create a new table in Oracle/SQL Server and practice for unique and check constraint.
14. Create a new table in Oracle/SQL Server and practice for any two date formats.
15. Create a new table in Oracle/SQL Server and practice for using clause.
16. Create a new table in Oracle/SQL Server and practice for having clause with sub queries.
17. Create a new table in Oracle/SQL Server and practice for alias in any table.
18. Create a new table in Oracle/SQL Server and practice for inner and outer join.
19. Create a new table in Oracle/SQL Server and practice for Drop command.
20. Write a PL/SQL program for addition of two numbers.
21. Write a PL/SQL program to find the factorial value of any entered number.
22. Write a PL/SQL program for swapping of two numbers.
23. Write a PL/SQL program to print first ten Natural Numbers.
24. Write a PL/SQL program to generate even series upto five digits starting from 2 and sum all the terms.
25. Write a PL/SQL program to practice for implicit and explicit cursor.



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Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. Database system concept , H. Korth and A. Silberschatz, TMH Publications .
2. Data Base Management System, Alexies&Mathews,Vikash publication.

Reference Books:

1. Data Base Management System, C. J. Date ,Narosha Publication.
2. Data Base Management System by James Matin.
3. Principles of Database System by Ullman.
4. Program Design, Peter Juliff, PHI Publications.
5. The Complete Reference, Kevin Loney, Oracle Press.
6. SQL, PL/SQL The Programming Language of Oracle, Ivan Bayross ,PustakKosh Publication.
7. Microsoft SQL Server Management and Administration, Ross, STM Publications.

E Resources:

1. SWAYAM URL link for DBMS and RDBMS: <https://youtu.be/f6LGtJutWyA>
2. SWAYAM URL link for DBMS and RDBM: <https://youtu.be/IoL9Ve2SRwQ>
3. SWAYAM URL link for DBMS and RDBMS : <https://swayam.gov.in/courses/4434-data-base-management-system>








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Part A: Introduction				
Program: M.Sc. (IT)		Semester: Second	Year: 1	w.e.f.:2023-2024
1.	Course Code	ITP202		
2.	Course Title	LAB 4: Programming in Java		
3.	Course Type	Practical		
4.	Pre-requisite (if any)	Theoretical and Practical knowledge of C/C++		
5.	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none">• Develop application using java based technologies.• Demonstrate the principles of object-oriented programming.• Understand multi-threading and event handling mechanism.• Express different Decision-Making statements and Functions.• Understand the concept of JDBC.• Develop website using JSP and Servlet.		
6.	Credit Value	2		
7.	Total Marks	External Marks: 100	Min Passing Marks:36	

Part B: Content of the Course	
Total Hours: 60	
Tentative Practical List	<p>Note: Following is tentative list of programs the teachers concerned can add more programs as per requirement.</p> <ol style="list-style-type: none">1. Create a java program to implement stack and queue concept.2. Write a java package to show dynamic polymorphism and interfaces.3. Write a java program to show multithreaded producer and consumer application.4. Create a customized exception and also make use of all the 5 exception keywords.5. Convert the content of a given file into the uppercase content of the same file.6. Develop an analog clock using applet.7. Develop a scientific calculator using swings.8. Create an editor like MS-word using swings.9. Create a servlet that uses Cookies to store the number of times a user has visited your servlet.10. Create a simple java bean having bound and constrained properties.11. Write a java program to create an abstract class named shape that contains two integers and an empty method named print Area () Provide three classes named Rectangle. Triangle and Circle such that each one of the classes



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extends the class shape. Each one of the class contains only the method print Area () that print the area of the given shape.

12. Write a Java program that implements a multithreaded program that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd the third thread will print the value of the cube of the number.
13. Write a java program which creates a list containing ice cream flavours. On selection of any flavour price should be displayed in a text field.
14. Write a JDBC program to create a table product (id number, name varchar. Price varchar). And insert a record in the table.
15. Write a program to execute a select query using JDBC.
16. Write a program to execute an Update query using JDBC.
17. Write a server program to return the square root of a number to the client using Socket.
18. Write a server program to return Date and time to clients using socket programming.
19. Write a JSP program for basic arithmetic functions.
20. Write a advance java program to implement registration of student by using JSP.
21. Write a program to design a web page for login form and connect to the database while using JSP and JDBC.

Part C - Learning Resource

Text Books, Reference Books, E-Resources

Text Books:

1. The complete reference, Naughton P and Schildt H., Osborne , McGraw-Hill, Berkeley Publication.
2. Java Programming, By E.Balgurusamy, McGraw-Hill Publication.

Reference Books:

1. An Introduction to JAVA programming, James R. Levenick ,Firewall Media publication.
2. Core JAVA for beginners, Rashmi KantaDas ,Vikas Publication.
3. Java beginners Guide, Herbert Schildt, McGraw-Hill Publication.

E-Resources:

1. SWAYAM URL link for Java :https://onlinecourses.swayam2.ac.in/aic20_sp13/preview
2. SWAYAM URL link for Java :https://onlinecourses.nptel.ac.in/noc19_cs84/preview
3. SWAYAM URL link for Java :<https://www.dqindia.com/iit-bombay-offers-free-online-course-java-swayam-platform/>
4. SWAYAM URL link for Java :<https://www.classcentral.com/course/swayam->



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programming-in-java-12930

5. Coursera URL Link for Java : <https://www.coursera.org/specializations/core-java>
6. Udemy URL Link for Java: <https://www.udemy.com/course/java-development-for-beginners-learnit/>

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