Department of Science & Computer Science

B. Sc. II

S. No.	Course Title	Course Type
1.	Computer networks and Information security	Major
2.	Object Oriented Programming with JAVA	Major
3.	Electricity Magnetism and Electromagnetic Theory	Minor
4.	Advanced Calculus and Partial Differential Equations	Elective

ST. PAUL INSTITUTE OF PROFESSIONAL STUDIES

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PART A- Introduction

Program: **Diploma**		Class: **B.Sc. II Year**	Session: **2025-26**
1	Subject Group	**Computer Science**	
2	Course Code	**BS-201T**	
3	Course Title	**Computer Networks and Information Security**	
4	Course Type	Core Course - (Major-I)	
5	Pre-Requisite	NIL	
6	Course Learning Outcomes	After completing this course student will be able to: 1. Define and describe the components of Data Communications System such as various protocols, OSI Model, data transmission in analog and digital format. 2. Identify and differentiate among the network devices and drivers. 3. Learn and describe various Error detection and correction methods. Define various terminologies used in networks and application layers open hot girls. 4. Compare warriors network technologies add can decide the suitable technologies installation as per requirement and environment at any workplace. 5. Describe various protocols and can identify the application areas of each protocol. 6. Know the fundamentals of network and information security issues Lords and various security technologies which can be applied on work place. 7. Students will develop skills for effective collaboration with global teams, fostering international cooperation and knowledge exchange.	
7	Credit value	**THEORY - 4 Credits**	
8	Total Marks	Mix. Marks: 70+30 Min. Passing Marks: 35	

12/03

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PART B- Content of the Course

Total no. of Lectures (in hours per week): - 4 Total Lectures: -60

Unit	Topic	No. of Lectures
I	**Introduction to Computer Network:** **Use of computer network:** Access to information, person to person communication, electronic commerce, internet of things. **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.	12
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 concepts — cells, handoff, paging,1G,2G,3G,4G& 5G technology. **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. Keywords: Coaxial cable, fiber optics, 2G, 3G, 4G, 5G.	12

III	**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 Addresses, IPv4 Address, IPv6 Address. **Virtual Circuit Networks**: Frame Relay and ATM. Transport Layer: Process-Process Delivery: UDP, TCP. **Application Layers**: DNS, SMTP, POP, ftp,http and https. Basics of Wi-Fi(fundamental Concepts). **Switching Techniques:** Packet Switching, Circuit Switching, Datagram Networks, Virtual-Circuit Networks and Structure of a Switch. **Network Devices & Drivers:** Router, Modem, Repeater, Hub, Switch, Bridge and Gateways (fundamental Concepts) **Keywords:** Routing Algorithm, IPv4, IPv6, ATM, SMTP, http, ftp, error correcting codes, error detecting codes, SONET, ADSL, point -to-point Modem, Repeater, Hub, Switch, Bridge, Gateways.	14
IV	**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, Ci her, Cryptography.	14

V	**Computer and Cyber Crimes:** Cyber crime and related concepts, Distinction between Cyber Crime into conventional crimes, Cyber criminals and their Objectives, Kinds of cybercrimes, Cyber stalking, forgery and fraud,crime related to IPRs, cyber terrorism, Ransom ware attacks, Computer vandalism. **Cyber Laws-**Introduction to IT Laws and 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 Law: e-Commerce, Online Contacts, IPRs (copyright, trademarks and software patenting), e-texation;e-governance and cybercrimes, Cyber Law in India with special reference to Information Technology Act 2000 and Recent amendments. **Keywords:** Cyber-crime, Cyber stalking, cyber fraud, IPR IT Laws, e-commerce, e-Taxation, e governance, mail bombs.	8

PART C- Learning Resources

Textbooks/ Reference Books:

1. 1.Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, Computer Networks 6th edition,2021, Pearsons.
2. 2.Michael E Whitman and Herbert J Matthord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
3. 3M. Merkow, J Breithaupt, Information Security Principles and Practices, 2nd Edition, 2014, Pearsons Education.
4. 4.G.R.F. Snyder, T. Pardoe, Network Security, Cengage Learning.
5. Praveen Kumar Shukla, Surya Prakash Tripathi, Ritendra Goel, Introduction to information Security and Cyber Laws", 2014, Dreamtech Press.
6. Faiyaz Ahamad, KLSI"Cyber Law and Information Security" 2013, Dreamtech Press.
7. Book Published by M.P. Hindi Granth Academy, Bhopal.

Reference Books:

1. Kurose James F., Ross Keith w. Computer Networking, A Top Down Approach, 6th Edition, 2017, Pearson
2. Micki Krause, Harold F. Tipton, Handbook of Information Security Management, Vol. 1-3, CRC Press LLC.
3. B.A. Forouzan: Data Communications and Networking, 4th edition, TMH Publishing company ltd.
4. Basta, W. Halton, Computer Security: Concepts, Issues and implementation, Cengage Learning, India.

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Suggested Digital Platforms, Web Links:

1. Free CCNA I Ethernet LAN Switching (Part 1) | Day 5 (https://vvww.youtube.com/watch?v=u2n762WGOVo)
2. e CCNA I Analyzing Ethernet Switching I Day 6 Lab (https://www.youtube.com/watch?v=Ig0dSaOOD18)
3. Free CCNA I IPv4 Addressing (Part 1) | Day7 (https://www.youtube.com/watch?v=3ROdsfEUuhs)
4. __Free CCNA I OSI Model & TCP/IP Suite (https://www.youtube.com/watch?v=t-ai8JzhHuY)
5. Free CCNA I Interfaces and Cables I Day3 (https://www.youtube.com/watch?v=ieTH51VhNaY)
6. Free CCNA I Intro to the CLI I Day 4 (https://www.youtube.com/watch?v=IYbtai7Nu2g)
7. Free CCNA I Ethernet LAN Switching (Part 1) | Day 5 (https://vvww.youtube.com/watch?v=u2n762WGOVo)
8. e CCNA I Analysing Ethernet Switching I Day 6 Lab (https://www.youtube.com/watch?v=Ig0dSaOOD18)
9. Free CCNA I IPv4 Addressing (Part 1) | Day7 (https://www.youtube.com/watch?v=3ROdsfEUuhs)
10. Free CCNA I IPv6 Part 1 | Day 31 (https://www.youtube.com/watch?v=ZNuXyOXae5U)

Part D- Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 30 marks University Exam (UE) :70 marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE):30	Class Test Assignment/Presentation E-quiz	30
External Assessment:	Section(A) : Six Very Short Questions	06 x 01 = 06
University Exam Section: 70	Section (B) : Five Short Questions	05 x 08 = 40
Time : 03.00 Hours	Section (C) : Two Long Questions	02 x 12 = 24 Total 70

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PART A- Introduction

Program: **Diploma**		Class: **B.Sc. II Year**	Session: **2025-26**
1	Subject Group	**Computer Science**	
2	Course Code	**BS-201P**	
3	Course Title	**Computer Networks Labs**	
4	Course Type	**Core Course- (Major-I)**	
5	Pre-Requisite	Open for all	
6	Course Learning Outcomes	After completion of this lab course student will be able to: 1. learn and identify various cables used in the networking. 2. Learn identify various connectors used to connect different cables. 3. Use the various tools for preparing the connectors for cables. 4. Configure and manage various local area networks at home and at workplace.	
7	Credit value	**Practical – 2 credits**	
8	Total Marks	Mix. Marks: 70+30 Min. Passing Marks: 35	

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PART B- Content of the Course

Total no. of Lectures (in hours per week): - 1 Hr. **Total Lectures: - 30 Hrs.**

Unit	Topic	No. of Lectures
I	**1. Study of UTP network cable** ○ Study the colour code of UTP cable ○ categories of UTP network cable ○ shielding of network ○ Electricity interface with network cable ○ maximum length for which data cable can be used crimping of RJ 45 connector and punching of data network cable ○ penta scanning of cabling work ○ rules of UTP laying	5
	2. Knowledge of the structured cabling and its components ○ Information outlet with box ○ Network rack (4U, 6U, 9U, 12U,24U, 32U, 42 U) ○ Patch panel ○ Rack management	5
	3. study of optical fibre cable ○ Different cores of OFC (6 core,12,24 core) ○ Multimode and single mode OFC cable ○ Shielding of OFC ○ Splicing/termination of OFC ○ OTDR testing ○ LIU fixing ○ LIU Management ○ Media converter ○ SFP module ○ Rules of OFC Laying	5
	4. Use of tools ○ Crimping tool ○ punching tool ○ nose plier ○ wire stripping and cable cutter ○ multimeter ○ RJ 45, RJ11 RJ12 Cat5, Cat6 Network Cable Tester ○ In-Line Coupler (RJ45 F/F) ○ RJ45 Network Splitter Adapter 2-way	5
	5. Configuration/management of local area network ○ Implementation of file and printer sharing ○ installation of FTP server and client ○ connect the computers in local area network	10

	○ configuring Class A IP address on LAN connection in computer lab and then use following tools: ping, Ipconfig, get Mac, host name, NS lookup, tracert, ARP, path ping, system info. ○ Configure static routing using packet tracer software. ○ Configure dynamic routing using packet tracer ○ Configure v lane using managed switch device slash packet tracer ○ implementation of subnetting in Class A, B and C. ○ Ping between 2 systems using IPV 6 ○ Configuration of NAT for incoming packet request ○ Configuration of software/hardware firewall to block outgoing requests to facebook.com.	

PART C- Learning Resources

Textbooks:

1. Andrew S. Tanenbaum, Nick Feamster, David J. Wetherall, Computer Networks 6th edition,2021, Pearsons.
2. Michael E Whitman and Herbert J Matthord, Principles of Information Security, Fourth Edition, CENGAGE Learning, 6th Indian Reprint.
3. M. Merkow, J Breithaupt, Information Security Principles and Practices, 2nd Edition, 2014, Pearsons Education.
4. Book Published by M.P. Hindi Granth Academy, Bhopal.

Reference Books:

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

Suggested Digital Platforms, 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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Part D – Assessment and Evaluation			
Maximum Marks: 100			
Suggested Continuous Evaluation Methods:			
Internal Assessment	Marks	External Assessment	Marks
Class Interaction/Quiz		Viva Voce on Practical	
Attendance		Practical Record File	
Assignments (Charts/Model Seminar/ Rural Service/Technology Dissemination/Report of Excursion/Lab Visits/Industrial visit)		Table Work/ Experiment	
Total	30		70

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PART A: Introduction			
Program: Diploma		Class: B.Sc. II Year	Session: 2025-26
Subject: **Computer Science**			
1.	Course Code	**BS-202T**	
2.	Course Title	**Object Oriented Programming with Java**	
3.	Course Type (Core Course/Elective/Gener	**Core Course — Major — II**	
4.	Pre-Requisite (if any)	To study this course, a student must have successfully completed the course on Programming Methodology at Certificate Level.	
5.	Course Learning Outcomes (CLO)	After the completion of this course, a successful student will be able to do the following: 1. Implement 'Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity. 2. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to a specific problem. 3. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved. 4. Demonstrate understanding and use of different exception handling mechanisms and concepts of multi-threading for robust faster and efficient application development. 5. Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events. 6. Identify, Design & Develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture. 7. Students will develop skills for effective collaboration with global teams, fostering international cooperation and knowledge exchange.	
6.	Credit Value	**Theory - 4 Credits**	**Practical — 2 Credits**
7.	Total Marks	Max. Marks : **30+70**	Min. Marks: **35**

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PART B: Content of the Course		
No. of Lectures (in hours per week): **2 Hrs. per week**		
Total No. of Lectures: **60 Hrs.**		
Module	**Topics**	**No. of Lectures**
I	**OOPS -** Object Oriented Paradigm, Benefits of OOP, Applications of OOP. **Java -** History, Java Features, How Java Differs from C and C++, Java and interne, 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	12
II	**Java Basics** -Constants, Variables, Data Types, Declaration of Variables, Giving Values to Variables, Scope of Variable, Symbolic Constants, 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 Expressions, Precedence of Arithmetic Operators, Type Conversions in Expressions, Operator Precedence and Associativity, Mathematical Functions. **Decision Making** with if Statement, Simple if Statement, if.....Else Statement, Nesting of if ...else Statement, if-else Ladder, The Switch Statement, The ? Operator. **Loops -** While Statement, Do Statement, For Statement, Jump in Loops, Labeled Loops. **Keywords:** Operators Arithmetic Expressions, Decision Making, Loops	12

III	**Class** - Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, **Constructors** — definition and types, Methods Overloading, Static Members, Nesting of Methods. **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. **Keywords:** Class, Constructors, Inheritance, Final, Abstract Methods, Overloading	12
IV	**Java API Packages** - Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, 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. **Types of Errors** - Exceptions, Syntax of Exception Handling Code, Multiple Catch Statements, Using Finally Statements, Throwing Our Own Exceptions, Using Exceptions for Debugging. **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. **Keywords:** API, threads, synchronization, errors, Applets, debugging	12
V	**More About the Applet tag** - Passing Parameters to Applets, Aligning the Display, More About HTML Tags, Displaying Numbering Values, Getting Input from the user. **The Graphics Class** - Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets, Drawing Bar Charts. **Concept of Stream** - Stream Classes, Byte Stream Classes, Character Stream Classes, Using Streams, **Other Useful I/O. Classes** - Using the File Class, Input / Output Exceptions, Creation of Files, Reading / Writing Characters, Reading / Writing Bytes, Handing Primitive Data Types, Concatenating and Buffering Files, Random Access, Files, Interactive Input and Output, other Stream Classes. **Keywords:** Stream, files, Graphics class, buffering, HTML tags	12

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PART C: Learning Resources
Textbooks, Reference Books, Other Resources
Suggested Readings
Textbooks - • 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. Horsttnann, 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/ww w/downloadijava/LeamJava.pdf
ht tps://www.tutorialspoint.com/java/javatutorial.pdf
https://wvv w.youtube.comiwatch9v=7s3xDfdqfDw
http://www.mphindigranthacademv.org/
Suggested equivalent online courses
https://nptel.ac.in/courses/ 106/105/106105191/

Part D- Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 30 marks University Exam (UE) :70 marks		
Internal Assessment:	Class Test	30
Continuous Comprehensive	Assignment/Presentation	
Evaluation (CCE):30	E-quiz	
External Assessment:	Section(A) : Six Very Short Questions	06 x 01 = 06
University Exam Section: 70	Section (B) : Five Short Questions	05 x 08 = 40
Time : 03.00 Hours	Section (C) : Two Long Questions	02 x 12 = 24 Total 70

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PART A: Introduction			
Program: **Diploma**		Class: **B.Sc. II Year**	Session: **2025--26**
Subject: **Computer Science**			
1.	Course Code	**BS-202P**	
2.	Course Title	**Java Programming Lab**	
3.	Course Type	**Core Course - Major- II**	
4.	Pre-Requisite (if any)	To study this course, a student must have successfully completed the course on Programming Methodology at Certificate Level.	
5.	Course Learning Outcomes(CLO)	**After the completion of this course, a successful student will be able to do the following:** 1. Implement Object Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity. 2. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to a specific problem. 3. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved. 4. Demonstrate understanding and use of different exception handling mechanisms and concepts of multi-threading for robust faster and efficient application development. 5. Identify and describe common abstract user interface components to design GUI in Java using Applet & AWT along with response to events. 6. Identify, Design & Develop complex Graphical user interfaces using principal Java Swing classes based on MVC architecture.	
6.	Credit Value	**Practical - 2 Credits**	
7.	Total Marks	Max. Marks :**70+30**	Min. Passing Marks: **35**

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PART B: Content of the Course		
No. of Lab. Practicals (in hours per week): **1. Hr. per week**		
Total No. of Lab.: **30 Hrs.**		
	Suggestive List of Practicals	**No. of Labs.**
	(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 grass salary of employee. 12. Write a program to convert the given no of days into months & days using with classes, objects and method. 13. Write a program to convert given string into Uppercase and lowercase and get the 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.	30

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

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PART C: Learning Resources
Textbooks, Reference Books, Other Resources
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Suggestive digital platform web links
https://www.cs.cmu.edu/afs/cs.cmu.edu/user/gchen/www/dow nloadijava/LearnJava.pdf https://www.tutorialspoint.cona/java/java tutorial.pdf https://www.youtube.comiwatch?v=7s3xDfdqfDw http://www.mphindigranthacademy.org/ Suggested equivalent online courses https://nptel.acin/courses/106/105/106105191/

Part D – Assessment and Evaluation			
Maximum Marks: 100			
Suggested Continuous Evaluation Methods:			
Internal Assessment	**Marks**	**External Assessment**	**Marks**
Class Interaction/Quiz		Viva Voce on Practical	
Attendance		Practical Record File	
Assignments (Charts/Model Seminar/ Rural Service/Technology Dissemination/Report of Excursion/Lab Visits/Industrial visit)		Table Work/ Experiment	
Total	**30**		**70**

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Part A - Introduction		
Program: Diploma	**Class: B.Sc. II Year**	**Session: 2025-2026**
Subject: Physics		
1.	Course Code	**BS-203T**
2.	Course Title	**Electricity Magnetism and Electromagnetic Theory (Paper 2)**
3.	Course Type (Major/ Minor/Elective/Generic Elective/Vocational/...)	Minor
4.	Pre- requisite (If any)	To study this course, the student must have passed B.Sc., I year with Physics.
5.	Course Learning Outcomes (CLO)	After the completion of the course, the student should be able to 1. Understand the basic concepts of electricity and magnetism and their applications. 2. Apply various network theorems and their applications in electronics, electrical circuit analysis, and electrical machines. 3. Understand the construction and working of ballistic galvanometer and cathode ray oscilloscope. 4. Understand the concept of electromagnetic waves and their reflection and refraction from a plane surface. 5. Students will develop skills for effective collaboration with global teams, fostering international cooperation and knowledge exchange.
6.	Credit Value	**4**
7.	Total Marks	Max. Marks: 30+70 Min. Passing Marks: 35

Part B - Content of the Course		
Total number of Lectures (in hours): 60		
Unit	**Topics**	**Number of Lectures**
I	**Electrostatics:** 1. An overview of thermal and hydroelectric power plants in Madhya Pradesh. 2. Electrostatic field; Electricflux; Gauss's theorem of electrostatics; Applications of Gauss theorem: Electric field due to infinite long charged wire; Uniformly charged spherical shell and solid sphere; Chargedplate; Conservative nature of electrostatic field; Laplace and poisons equations; Uniqueness theorem. 3. Dielectrics; Polar and non-polar molecules; Parallel plate capacitor with a dielectric; Electrical susceptibility and dielectric constant; Polarization and Polarization vector(P); Displacement vector (D); Intensity of Electric field(E); Relationship between D, E and P. 4. Gauss's law in dielectrics; Clausius-Mossotti relation, Langevin-Debye formula; Ferroelectric and Para electric materials; Hysteresis loop for ferroelectrics. **Keywords/Tags:** Hydro electric power plant, Electrostatic field, Dielectrics, Polarization vector, Displacement vector.	12
II	**Magnetostatics** 1. Lorentz force equation and magnetic field B; Bio-Savart's law; Calculation of magnetic intensity H for solenoid and anchor ring. 2. Ampere's circuital law and its applications for solenoid And Toroid; Basic law of magnetostatics differential form $\nabla.B=O$, $\nabla XB=\mu_0 J$; Free and bound currents; Magnetization and magnetization vector **M**; Magnetic permeability and susceptibility; Derivation of VXM=Jb for a non-uniformly magnetized substance; Relationship between **B, H** and **M.** 3. Diamagnetic, Paramagnetic andFerromagnetic substances; B-H Curve and Hysteresis loss. 4. General idea about AC and DC motors, Motorwinding. **Keywords/Tags:** Magnetic field, Magnetization, Hysteresis loss, Motor winding.	12

III	**Current electricity** 1. Network theorems: Concept of ideal current and voltage sources; Thevenin's theorem; Norton's theorem; Millman's theorem; Maximum power transfer theorem. 2. Transient current: Growth and decay of current in LR circuit; Charging and discharging of a capacitor through resistor Measurement of high resistance by leakage; Charging and discharging of a condenser Through an inductance and resistance. 3. Alternating currents:Complex number and their applications in alternating current circuits (RL, RC and LC Series LCR (acceptor) and parallel LCR (rejector) circuits; Power factor. 4. A.C. bridges: Maxwell's bridge; Owen's bridge; Anderson's bridge; Kelvin's bridge. **Keywords/Tags:** Network theorems, Transient current, A.C. bridges.	12
IV	**Motion of charged particles in electric and magnetic field** 1. Motion of charged particles in electric and magnetic field: Electron Gun. Construction and working principle of Cyclotron and Betatron; Thomson's method for the determination of specific charge (elm) of electron. 2. Ballistic galvanometer: Torque on a current loop; Current, and charge sensitivity; Electromagnetic damping; Logarithmic damping; CDR. 3. Introduction to CRO: Block Diagram of CRO; Applications of CRO:(1)Study of Waveform, (2)Measurement of Voltage, Current, Frequency, and Phase Difference. 4. Electromagnetic induction: Faraday's law; Lenz's law; Self .and mutual inductance; Reciprocity theorem; Self-mutual of coil; Mutual inductance of two coils; Energy stored in magnetic field. **Keywords/Tags:** Motion of charged particles, specific charge, Ballistic galvanometer, CRO, Electromagnetic induction.	12

V	**Electrodynamics** 1. Equation of Continuity for current; Maxwell's displacement current; Derivation of Maxwell's equations; Poynting theorem. 2. Electromagnetic wave equations; Plane electromagnetic wave in vacuum and dielectric media; Reflection and refraction at a plane boundary of dielectric; Polarization by reflection and Fresnel's equation; Brewster's Law. 3. Electromagnetic Waves in conducting medium; Reflection and refraction of Electromagnetic wave by the ionosphere; Secant law; Skip distance and maximum usable frequency. **Keywords/Tags:** Displacement current, Poynting vector, Electromagnetic wave, Polarization by reflection.	12

Part C-Learning Resources

Text Books, Reference Books, Other resources
Suggested Readings: 1. Mahajan S. and Choudhury, "Electricity, Magnetism & Electromagnetic Theory",2012, Tata McGraw. 2. Griffiths D.J., "Electricity and Magnetism", 3rd Edn., 1998, Benjamin Cummings. 3. Tayal D. C., "Electricity and magnetism", Himalaya Publishing Co. 4. Murugesan, "Electricity and magnetism", S. Chand & Co. 5. Feynman R. P., Leighton R.B., Sands M., "Feynman Lectures Vol.2", 2008, Pearson Education 6. Kshetrimayun R. S., "Electromagnetic field theory", 2012, Cengage Learning.
Suggested equivalent online courses: 1 https://youtu.beiNED2C18u9Q0 Electromagnetic Theory by Prof D.K. Ghosh, Department of Physics, IIT Bombay

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Part D- Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE): 30 marks University Exam (UE) :70 marks		
Internal Assessment: Continuous Comprehensive Evaluation (CCE):30	Class Test Assignment/Presentation E-quiz	30
External Assessment: University Exam Section: 70	Section(A) : Six Very Short Questions	06 x 01 = 06
	Section (B) : Five Short Questions	05 x 08 = 40
Time : 03.00 Hours	Section (C) : Two Long Questions	02 x 12 = 24 Total 70

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Part A - Introduction			
Program: Diploma	**Class: B.Sc. II Year**		**Session: 2025-26**
	Subject: Physics		
.	Course Code	**BS-203P**	
2.	Course Title	**Electricity Magnetism and EMT Lab (Paper 2)**	
3.	Course Type (Major/ Minor/Elective/Generic Elective/Vocational/...)	MInor	
4.	Pre- requisite (If any)	To study this course, the student must have passed B.Sc. I year with Physics.	
. 5.	Course Learning Outcomes (CLO)	After the completion of the course, the student should be able to 1. Verify various laws in electricity and magnetism such as Lenz's law, Faraday's law. 2. Understand the construction, working and uses of various measuring instruments. 3. Verify various network theorems, using simple electric circuits.	
6.	Credit Value	**2**	
7.	Total Marks	Max. Marks: 70+30	Min. Marks: 35

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Part B - Content of the Course		
Total numbers of Practical (in hours): 60		
	List of experiments	**Number of Practical (in hours)**
1.	To draw the B-H curve and determination of Hysteresis loss.	60
2.	Determination of voltage, frequency and phase difference using CRO.	
3.	Study of sensitivity of CRO.	
4.	Verification of the Thevenin's theorem.	
5.	Verification of the Norton' s Theorem.	
6.	Verification of the maximum power transfer theorem.	
7.	Verification of the superposition theorem.	
S.	Measurement of self-inductance using Maxwell's bridge.	
9.	Measurement of unknown inductance using Kelvin's bridge.	
10.	Determination of self-inductance by Anderson's bridge.	
11.	To study of the charging and discharging of a condenser through a resistor.	
12.	Determination of impedance and power factor using LCR circuit.	
13.	Study of frequency response curve of a series LCR circuit and determination of resonant frequency, Quality factor and Band	
14.	To study of frequency response curve of a parallel LCR circuit and determination of anti-resonant frequency and Quality factor.	
15.	Determination of Dielectric constant of Kerosene by resonance method.	
16.	Determination of Self Inductance of a Coil by Rayleigh's Method using Ballistic Galvanometer.	
17.	Verification of Millman's theorem	
18.	To study the magnetic field along the axis of a circular coil.	
19.	Determinationof M and H using vibrational magnetometer and deflection magnetometer. Comparison of	
20.	Comparison of capacity of two capacitors using Ballistic Galvanometer.	

Part C-Learning Resources
Text Books, Reference Books, Other resources
Suggested Readings: 1. Prakash I. &Ramakrishna, "A Text Book of Practical Physics", Kitab Mahal, 2011,11/e. 2. Squires G. L., "Practical Physics", Cambridge University Press, 2015, 4/e. 3. Flint B. L. and Worsnop H. T., "Advanced Practical Physics for students", Asia Publishing House, 197. 4. Chattopadhyay D. & Rakshit P. C., "An Advanced Course in Practical Physics", New Central Book Agency. 5. Chattopadhyay D., Rakshit P.C. and Saha B., "An Advanced Course in Practical Physics", New Central Book Agency P. Ltd. 6. Singh S.P., "Advanced Practical Physics", Pragati Prakashan. 7. Tayal D. C., "University Practical Physics", Himalaya Publishing House 8. Kumar P. R. Sasi, " Practical Physics", PHI Publication 9. Srivastava Anchal, Shukla R. K., " Practical Physics", New Age International Publishers. 10. Agarwal D. C., "Experimental electronics", Technical Publishing House. 11.Srivastava J. P., " Elements of Solid state Physics", PHI Publication. **Suggestive digital platforms web links** 1. https://www.vlab.co.in/broad-area-physical-sciences , Virtual Labs (Physical Sciences), Ministry of Education 2. https://stpis.com/Lmicimecoursesonline.html , SWAYAM Online Courses

Part D-Assessment and Evaluation	
Suggested Continuous Evaluation Methods:	
Internal Assessment:	
	30
External Assessment:	
	70
The above marks distribution is given as per the ordinance 14B.	
Maximum Marks:100	

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Part A: Introduction			
Program: Certificate/ Diploma/ Degree Class: B.Sc. II Year Session: 2025-26			
Subject: Mathematics			
I	Course Code	**EL-211**	
2	Course Title	Advanced Calculus and Partial Differential Equations	
3	Course Type	**Elective**	
4	Pre-requisite (if any)	To study this course, a student must have had the subject Mathematics in Certificate Course or equivalent.	
5	Course Learning Outcomes (CLO)	On successful completion of the course the students shall be able to 1. Students should be able to understand and apply the concepts of limits, continuity, and differentiability in the context of functions of several variables. 2. Calculate the limit superior, the limit inferior, and the limit of a bounded sequence. 3. Apply the Rolle's , mean value theorems and Taylor's theorem. 4. Apply the various tests to determine convergence and absolute convergence of an infinite series of real numbers. 5. Ability to formulate partial differential equations from physical or geometric problems in fields such as Mathematics, Engineering , Physics. 6. Students will develop skills for effective collaboration with global teams, fostering international cooperation and knowledge exchange.	
6	Credit Value	6	
7	Total Marks	Max.Marks:30+70	Min. Passing Marks: 35

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Part B: Content of the Course		
Total No. of Lectures(in hours per week):6 hours per week		Total Lectures: 90 hours
Unit	Topic	No. of Lecture
I	Historical background: A brief historical background of Calculus and partial differential equations in the context of India and Indian heritage and culture .A brief biography of Bodhayana Field structure and ordered structure of R, intervals, bounded and unbounded sets, supremum and infimum, completeness in R, absolute value of a real number. Sequence of real numbers, Limit of a sequence Bounded and monotonic sequences. Cauchy's general principle of convergence. Algebra of sequence and some important theorems	18
II	Series of non-negative terms Convergence of positive term series Alternating series and Leibnitz's test Absolute and Conditional Convergence of Series of real terms Uniform continuity. Chain rule of differentiability Mean value theorems and their geometrical interpretations.	18
III	Limit and continuity of functions of two variables. Change of variables Euler's theorem on homogeneous functions. Taylor's theorem for functions of two variables. Jacobians.Maxima and Minima of functions of two variables. Lagrange's multiplier method. Beta and Gamma Functions.	18
IV	Partial differential equations of the first order. Lagrange's solution. Some special types of equations which can be solved easily by methods other than the general method. Charpit's general method. Partial differential equations of second and higher orders	18
V	Classification of partial differential equations of second order. Homogeneous and non-homogeneous partial differential equations of constant coefficients. Partial differential equations reducible to equations with constant coefficients	18

Part C: **Learning** Resources
Text Books. Reference Books, Other Resources
Suggested Readings: Text Books: 1. Devi Prasad: Advanced Calculus, Prentice Hall lndia Learning Private Limited,2009. 2. SC Malik and Savita Arora: Mathematical Analysis, New Age International Private Limited, 1st edition, 2017. 3. M. D. Raysinghania : Ordinary and Partial Differential Equations, S. Chand & Company, New Delhi, 2017.

4. Gerard G. Emch, R. Sridharan and M. D. Srinivas : Contributions to History of Indian Mathematics. Hindustan Book Agency, Vol. 3, 2005.
5. Business mathematics structure with applications to computer science. Indian edition JP Tremblay are Manohar McGraw Hill Publication

Part D- Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 100		
Continuous Comprehensive Evaluation (CCE) : 30 marks University Exam (UE) :70 marks		
Internal Assessment :	Class Test	30
Continuous Comprehensive	Assignment/Presentation	
Evaluation (CCE):30	E-quiz	
External Assessment :	Section(A) : Six Very Short Questions	06 x 01 = 06
University Exam Section: 70	Section (B) : Five Short Questions	05 x 08 = 40
Time : 03.00 Hours	Section (C) : Two Long Questions	02 x 12 = 24 Total 70

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B.Sc. II Year

Type	Subject Group	Course Code	Course Title	Credit	Total Credit Hours	Lecture Hours Per Week	Max. Marks		Total marks
							External	Internal	
Major	Computer Science	BS-201T	Computer networks and Information security	4	60	4	70	30	100
	Computer Science	BS-201P	Computer networks Lab	2	30	2	100		100
Major	Computer Science	BS-202T	Object Oriented Programming with JAVA	4	60	4	70	30	100
	Computer Science	BS-202P	JAVA Programming Lab	2	30	2	100		100
Minor	Physics	BS-203T	Electricity Magnetism and Electromagnetic Theory	4	60	4	70	30	100
	Physics	BS-203P	Electricity Magnetism and EMT Lab	2	30	2	100		100
Elective	Mathematics	EL-211	Advanced Calculus and Partial Differential Equations	6	90	6	70	30	100
	Business Economics	EL-202	Indian Economy	6	90	6	70	30	100
	Business Economics	EL-204	Entrepreneurship and Family Business	6	90	6	70	30	100
	NCC	EL-205T	NCC Part II	4	60	4	70	30	100
	NCC	EL-205P	NCC Training Part II	2	30	2	100		100
	Physical Education	EL-206T	Physical Education for Healthful Living	4	60	4	70	30	100
	Physical Education	EL-206P	Physical Education for Healthful Living	2	30	2	100		100
	English Literature	EL- 208T	Mass media and Communication Skills	4	60	4	70	30	100
	English Literature	EL- 208P	Experiments with Mass Media and Communication	2	30	2	100		100
	Digital Marketing	VO-201T	E-Commerce	2	30	2	70	30	100
	Digital Marketing	VO-201P	E-Commerce	2	30	2	100		100
	Web Designing	VO-202T	Web Development using PHP and MySQL	2	30	2	70	30	100
	Web Designing	VO-202P	Web Development using PHP and MySQL	2	30	2	100		100
	Personality Development	VO-203T	Personality Development	2	30	2	70	30	100
	Personality Development	VO-203P	Personality Development	2	30	2	100		100
	Retail Management	VO-204T	Supply Chain and Retail Management	2	30	2	70	30	100
	Retail Management	VO-204P	Supply Chain and Retail Management	2	30	2	100		100
	Export and Import management	VO-205T	Foreign Trade -Procedure and Documentation	2	30	2	70	30	100

Vocational	Export and Import management	VO-205P	Foreign Trade -Procedure and Documentation	2	30	2	100		100
	E-Acc. & Taxation with GST	VO-206T	E-Filing of Tax Returns	2	30	2	70	30	100
	E-Acc. & Taxation with GST	VO-206P	E-Filing of Tax Returns	2	30	2	100		100
	Accounting and Tally	VO-207T	Computerized Accounting	2	30	2	70	30	100
	Accounting and Tally	VO-207P	Computerized Accounting	2	30	2	100		100
	Financial Services and Insurance	VO-208T	Personal Finance and Planning	2	30	2	70	30	100
	Financial Services and Insurance	VO-208P	Personal Finance and Planning	2	30	2	100		100
	Salesmanship	VO-210T	Customer Relationship Management	2	30	2	70	30	100
	Salesmanship	VO-210P	Customer Relationship Management	2	30	2	100		100
Foundation	English	FC-201	English language and Foundation	2	30	2	50		50
	Hindi	FC-202	Bhasha aur Sanskriti	2	30	2	50		50
	Entrepreneurship Development	FC-203	Entrepreneurship Development	2	30	2	50		50
	Women Empowerment	FC-204	Women Empowerment	2	30	2	50		50
Project	Field Work	PR-201 A	Internship	4	60		100		100
	Field Work	PR-201 B	Apprenticeship	4	60		100		100
	Field Work	PR-201 C	Communality Engagement	4	60		100		100
	Project Work	PR-201 D	Project	4	60		100		100

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