St. Paul Institute of Professional Studies, Indore

An Autonomous Institute Affiliated to Devi Ahilya Vishwavidhyalaya, Indore
Accredited by NAAC with 'A' Grade
Phone No. 0731-2499911, 49661355, 4961356
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Part A: Introduction

Programme: Degree		Class: B.Sc. III Year	Session 2025-26
Subject: Computer Science			
1	Course Code	**BS-301T**	
2	Course Title	Operating System (Group A — Paper I) (Theory)	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite	This course can be opted as an elective by the students of Computer Science.	
5	Course Learning Outcomes	After the completion of this course, a student shall be able to do the following: • Describe the importance of computer system resources and the role of operating system in their management policies and algorithms. • Specify objectives of modern operating systems and describe how operating systems have evolved over time. • Understand various process management concepts and can compare various scheduling techniques, synchronization, and deadlocks. • Describe the concepts of multithreading and memory management techniques. • Identify the best suited memory management technique for any process. • Describe various file operations, file allocation methods and disk space management. • To understand and identify potential threats to operating systems and the security features design to guard against them.	
6	Credit Value	Theory - 4 Credits	
7	Total Marks	Max marks: 30+70 Minimum Passing Marks 35	

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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**
1	**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 Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems. Keywords: Function of OS, resource abstractions, multiprogramming, time sharing, workstation. **Process Management:** Process Concepts, Process states & Process Control Block. **Process Scheduling**: Scheduling Criteria, Scheduling Algorithms (Preemptive & Non-Preemptive) — FCFS, SJF, SRTN, RR, Priority, Multiple-Processor, Real-Time, Multilevel Queue and Multilevel Feedback Queue Scheduling. **Deadlock** - Definition, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock. **Deadlock Handling Approaches**: Prevention, Avoidance, Detection and Recovery. Keywords: process states, preemptive and non-preemptive scheduling, FCFS, SJF, RR, deadlock. ***Keywords: process states, preemptive and non-preemptive scheduling, FCFS, SJF, RR, deadlock.***	14
2	**Memory Management:** Introduction, Address Binding, Logical versus Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement Algorithms. **File Management:** Concept of File System (File Attributes, Operations, Types), Functions of File System, Types of File System, Access Methods (Sequential, Direct & other methods), Directory Structure (Single-Level, Two-Level, Tree-Structured, Acyclic-Graph, General Graph), Allocation Methods (Contiguous, Linked, Indexed). ***Keywords: swapping, fragmentation, paging, virtual memory, file management, directory structure.***	10
3	**Disk Management:** Structure, Disk Scheduling Algorithms (FCFS, SSTF, SCAN, CSCAN, LOOK), Swap Space Management, Disk Reliability, Recovery. **Security:** Security Threats, Security policy mechanism, Protection, Trusted Systems, Authentication and Internal Access Authorization, Windows Security. **LINUX:** Introduction, History and features of Linux, advantages, hardware requirements for installation, Linux architecture, file system of Linux - boot block, super block, inode table, data blocks. Linux standard directories, Linux kernel, Partitioning the hard drive for Linux, installing the Linux system, system - startup and shut-down process, init and run levels. Process, Swap, Partition, fdisk, checking disk free spaces. Difference between CLI OS & GUI OS, Windows v/s Linux, Importance of Linux Kernel, Files and Directories. Concept of Open-Source Software. ***Keywords: disk scheduling, recovery, authorization, boot block, kernel, partitioning, open source.***	10
4	**Linux Administration:** **Types of user-** Root and normal user, Multiple logins at same time (Ctrl + Alt + F1, F2..F6), who command. **Help: whatis, --** help, man command. **Basic Commands:**	14

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	For displaying current directory, files and directories of current/absolute/relative location(s), creating, removing, renaming, copying and moving files or directories. For comparing, and editing file content, displaying file content(s) with tr, head, tail, last, grep, sort, piping. Searching file content or searching file within different directories based on particular search criteria. For implementing general purpose utilities — calendar, date, calculator, basic arithmetic expressions, compression and extraction of file/directory. **Text editors:** vi, joe, vim, gedit, atom, nano etc. Command mode & Insert mode, cut, yank, undo. **Managing multiple processes:** connecting processes with pipes, tee, redirecting input output, changing process priority with nice, cron commands, kill, ps. **Managing user accounts-** Sudo, users: useradd, usermod, userdel, passwd. Group: Primary & Secondary Group, chgrp, chown, groupadd, groupdel. **Permissions:** adding and removing permissions. **Package installation** through GUI/ apt-get/yum/dnf. *Keywords: head, tail, grep, sort, piping, yank, kill, chgrp, chown, groupadd.*	
5	**Shell Programming:** Types of Shells, Shell Meta Characters - $#, $*$?, Shell Variables, Shell Scripts, Debugging scripts, echo, read, operators, keywords, Integer Arithmetic and String Manipulation, Functions, I/O Redirection and Piping **Decision Making:** if-else-elif-fi, case-esac **Loop Control:** while, for, until, break & continue **Automation and Exception Handling:** Creating shell programs for automating tasks, file handling, trapping signals etc **Android Operating System:** Introduction, Development Framework, Application Architecture, Process Management and File System, Small Application Development using Android Development Framework. **Indian contribution to the field** — the BOSS operating system, open source softwares, growth of LINUX, Aryabhatt Linux, contributions of innovators — Rajen Sheth, Sunder Pichai etc. ***Keywords: shell programming, exception handling, Android development framework. BOSS OS, Linux, Arya Bhatt, Rajen Sheth, Sunder Pichai.***	12

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Part C- Learning Resources

Suggested Readings

Text books:

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

Reference Books:

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

Suggestive digital platforms, web links:

https://web.iitd.ac.in/~minati/MTL458.html
https://www.cse.iith.ac.in/~mythili/os/
hitps://www.youtube.com/watch?v=aCJ3YgoolHQ

Suggested equivalent online courses

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

Part D-Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/ Presentation/ Assignment	30
External Assessment: University Exam Section: 70 Time: 03.00 Hours	**Section(A):** Six Very Short Questions **Section (B):** Five Short Questions **Section (C):** Two Long Questions	06 x 01 = 06 05 x 08 = 40 02 x 12 = 24 Total 70

Any remarks/suggestions:

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Part A: Introduction

Programme: Degree		Class: B.Sc. III Year Session 2025-26
Subject: Computer Science		
1	Course Code	**BS-301P**
2	Course Title	Operating System Lab (Group A — Paper I) (Practical)
3	Course Type	Discipline Specific Elective
4	Pre-requisite	This course can be opted as an elective by the students of Computer Science.
5	Course Learning Outcomes	After the completion of this course, a student shall be able to do the following: • Operate the Linux system, along with its administration and Shell programming. • Understand and be familiar with the Linux environment. • Learn and run the various Linux commands. • Use vi editor for programming. • Learn and run the shell scripting programs.
6	Credit Value	Practical - 2 Credits
7	Total Marks	Max marks: 30+70 Minimum Passing Marks 35

Part B: Content of the course

No. of Practicals (in hours per week): 2 **Lab. Per week**

Total No. of Lab.: **30Hrs**

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

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	h) Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory.	

Part C- Learning Resources

Textbooks, Reference Books, Other Resources
Suggested Readings
• Richard Peterson, Linux: The Complete Reference, TMH • Sumitabh Das, Linux, McGraw Hill • Jason Cannon, Linux for Beginners, Createspace Independent Publishing Platform • William E. Shotts Jr., The Linux Command Line: A Complete Introduction, O'Reilly Media, Inc.
Suggestive digital platforms, web links:
https://web.iitd.ac.in/~minati/MTL458.html| https://www.cse.iith.ac.in/~mythili/os/ hitps://www.youtube.com/watch?v=aCJ3YgoolHQ
Suggested equivalent online courses
https://nptel.ac.in/courses/106/102/106102132/
hitps://www.youtube.com/watch?v= OHCMfsNpgCe

Part D-Assessment and Evaluation

Internal Assessment:		**External Assessment:**	
Class Interaction/Quiz	30	Viva voce practical	70
Attendance		Practical record file	
Assignments (Charts/ Model)/ Technology Dissemination/ Excursion/ Lab visit/ Industrial		Table work / Experiments	
Total Marks: 100			

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Part A: Introduction

Programme: Degree		Class: B.Sc. III Year	Session 2025-26
Subject: Computer Science			
1	Course Code	**BS-302T**	
2	Course Title	Programming with Python (Group A — Paper II) (Theory)	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite	To study this course, a student must have successfully completed the course on Programming at Certificate/Diploma Levels. This course can be opted as an elective by the students of Computer Science.	
5	Course Learning Outcomes	After studying this subject, students shall be able to — • Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements. • Express proficiency in the handling of strings, functions and file handling. • Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets. • Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python with class, modules and packages. • Identify the commonly used operations involving database connectivity and use of tkinter for GUI programming.	
6	Credit Value	Theory - 4 Credits	
7	Total Marks	Max marks: 30+70 Minimum Passing Marks 35	

Part B: Content of the course

No. of Lectures (in hours per week): 4 **Per week**

Total No. of Lab.: **60Hrs**

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

	writing-write (), write lines (), seek (), tell (). Word count, copy file scripts through file handling concepts. **Keywords: function, calling a function, arguments, global variables, read, write, copy, seek.**	
IV	**Classes, modules and exceptional handling:** Classes: Introduction, Member variables and defining methods, constructor, destructor, data encapsulation, inheritance, multiple inheritance, diamond problem solving technique of python. Modules: inbuilt modules- sys, random, time etc. import, from..import, from..import*. Constructing packages, role of _ init .py Exceptional Handling: The try-except-else-finally block, the raise statement, the hierarchy of exceptions, adding exceptions. **Keywords: class, constructor, destructor, encapsulation, inheritance, exception, modules.**	12
V	**Database & GUI Programming:** Importing sqlite, connecting to database, creating table, insert, select, update, delete, drop tables, accessing and modifying tables through python. Graphical user interfaces; event-driven programming paradigm; tkinter module, creating simple GUI, buttons, labels, entry fields, dialogs; widget attributes — sizes, fonts, colors layouts, nested frames. **Keywords: GUI, tables, database, insert, update, drop tables, event- driven programming, dialogs, frames.**	12

Part C- Learning Resources

Textbooks, Reference Books, Other Resources
Suggested Readings
Textbooks: • Taneja Sheetal & Kumar Naveen, "Python Programming: A modular approach™, Pearson. • Liang Y. Daniel, "Introduction to Programming Using Python™, Pearson. **Reference Books:** • Zed A. Shaw, "Learn Python the Hard Way", Zed Shaw's Hard Way Series. • Charles Dierbach, "Introduction to Computer Science using Python", Wiley. • Michael T. Goodrich, "Data Structures and Algorithms in Python", Wiley.
Suggestive digital platforms, web links: https://www.guru99.com/how-to-install-python.html https://www.udemy.com/course/pythonforbeginnersintro. https://www.python.org/about/gettingstarted/ https://spoken-tutorial.org/media/videos/89/Python-3.4.3-Instruction-Sheet-English.pdf
Suggested equivalent online courses
https:/nptel.ac.in/courses/106/106/106106145/ **https://www.youtube.com/watch?v=rfscVSOvtbw** **https://onlinecourses.swayam? ac.in/aic20 _sp33/preview**

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

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Part A: Introduction

Programme: **Degree**		Class: B.Sc. III Year	Session 2025-26
Subject: Computer Science			
1	Course Code	**BS-302P**	
2	Course Title	Python Programming Lab (Group A — Paper II) (Practical)	
3	Course Type	Discipline Specific Elective	
4	Pre-requisite	To study this course, a student must have successfully completed the course on Programming at Certificate/Diploma Levels. This course can be opted as an elective by the students of Computer Science.	
5	Course Learning Outcomes	After studying this subject, students shall be able to — • Understand the python environment and its text editor. • Code and run the programs. • Debug the program. • Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements. • Identify the commonly used operations involving database connectivity and use of tkinter for GUI programming.	
6	Credit Value	Practical - 2 Credits	
7	Total Marks	Max marks: 30+70 Minimum Passing Marks 35	

Part B: Content of the course

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

Total No. of Lab.: **30Hrs**

	Suggestive List of Practicals	**No. of Labs.**
	1. Find all numbers which are multiple of 17, but not the multiple of 5, between 2000 and 2500. 2. Print the first 2 and last 3 characters in a given string. Use the string slicing. 3. Write a program that eliminates duplicates in a list. 4. Implement shallow copy and deep copy of a list. 5. Find the largest of n numbers, using a user defined function largest () 6. Write a function that capitalizes all vowels in a string. 7. Read a line containing digits and letters. Write a program to give the count of digits and letters. 8. Write a function my Reverse () which receives a string as an input and returns the reverse of the string. 9. Use the list comprehension methodology in python, to generate the squares of all odd numbers in a given list. 10. Generate a dictionary and print the same. The keys of the dictionary should be integers between 1 and 10 (both inclusive). The values should be the cubes of the corresponding keys. 11. Create a nested dictionary. The roll number of a student maps to a dictionary. This inner dictionary will have name, age, and place as keys. Read details of at least three students. 12. Enter a word. Create a dictionary with the letters of this word as keys, and the corresponding ASCII values as values.	30

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	13. Define a class with three methods: readString(), printString(), writeString(). The first method should read the contents of a file. The second method should print the contents to the console. The third method should write the contents to a new file. 14. Create a class account which has constructor to input account_no, name, balance | from user, print_ account() to display the account details, and deposit(), withdraw() which inputs amount and add/subtract them from the total amount of individual object. 15. Create a database table in sqlite and show the table data in python. 16. Implement DML commands in SQLite from python interface. 17. Implement tkinter methods in a python script.	

Part C- Learning Resources

Textbooks, Reference Books, Other Resources
Suggested Readings
Textbooks: • Taneja Sheetal & Kumar Naveen, "Python Programming: A modular approach", Pearson. • Liang Y. Daniel, "Introduction to Programming Using Python™, Pearson. **Reference Books:** • Zed A. Shaw, "Learn Python the Hard Way", Zed Shaw's Hard Way Series. • Charles Dierbach, "Introduction to Computer Science using Python", Wiley. • Michael T. Goodrich, "Data Structures and Algorithms in Python", Wiley.
Suggestive digital platforms, web links:
https://www.guru99.com/how-to-install-python.html https://www.python .org/about/gettingstarted/ https://spoken-tutorial.org/media/videos/89/Python-3.4 3-Instruction-Sheet-English. pdf
Suggested equivalent online courses
https://nptel.ac.in/courses/106/106/106106145/ https://www.youtube .com/watch?v=rfsc VS0vtbw **https://onlinecourses.swayam2.ac.in/aic20_sp33/preview**
hitps://www.youtube.com/watch?v= OHCMfsNpgCc

Part D-Assessment and Evaluation

Internal Assessment:		**External Assessment:**	
Class Interaction/Quiz	30	Viva voce practical	70
Attendance		Practical record file	
Assignments (Charts/ Model)/ Technology Dissemination/ Excursion/ Lab visit/ Industrial		Table work / Experiments	
Total Marks: 100			

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Part A: Introduction

Programme: Degree Course	**Class: B.Sc. III Year**	**Session 2025-26**
Subject: Physics		
Course Code	**BS-303T**	
Course Title	**Quantum Mechanics, Solid State Physics and Devices (Theory)**	
Course Type	Minor	
Pre-requisite	To study this course, the student must have had Physics as a subject in Diploma.	
Course Learning Outcomes	On completion of the course, the students will be able to 1. Understand the necessity of quantum mechanics and its applications. 2. Explain the atomic structures and X-rays. 3. Identify the molecular spectra such as electronic, rotational and vibrational. 4. Identify the various materials using the Raman spectroscopic technique. 5. Use different types of diodes and transistors in various electronic applications. 6. Analyze the amplifiers and oscillators. 7. Students will develop skills for effective collaboration with global teams, fostering international cooperation and knowledge exchange.	
Credit Value	Theory – 4 credits	
Total Marks	Max. Marks: 30 + 70 Min. Passing Marks: 35	

Part B: Content of the course

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

Unit	Topic	No. of lectures
1	Introduction to Quantum Mechanics 1. A brief biography of Chandrasekhara Venkata Raman and w their major contribution to science. 2. Limitations of classical mechanics and origin of quantum mechanics, Black body radiation, Photoelectric effect, Compton effect, De-Broglie hypothesis, Davisson-Germer experiment, Wave packet, Phase velocity and Group velocity. 3. Heisenberg uncertainty principle, Different forms of uncertainty principle. Schrodinger wave equation: Time dependent and time independent equation. Physical interpretation of wave function, Equation of Continuity. 4. Operator in quantum mechanics: Eigen functions and Eigenvalues, Hermitian operator. Position and Momentum operator, Total energy operator (Hamiltonian), Expectation value, Parity operator, Ehrenfest Theorem. **Keywords/Tags:** Quantum mechanics, Uncertainty principle, Eigenfunctions.	12
2	**Application of quantum Mechanics and Atomic structure** 1. Application of Schrédinger equation: Free particle. Particle in one-dimensional box, Rectangular potential barrier, Tunnel	12

	effect, One dimensional Harmonic | Oscillator. 2. Three dimensional Schrédinger equation. The radial and angular equation, Hydrogen atom, electron probability density. 3. Bohr's atomic model, Atomic spectra of Hydrogen, Sommerfeld model, electron spin, Stern — Gerlach | experiment, Orbital and spin angular momentum, Concept of space quantization, Quantum numbers. **Keywords/Tags:** Tunnel effect, Harmonic Oscillator. Quantum numbers, Atomic model.	
3	**Many — Electron atom** 1. Pauli's exclusion principle, Electronic configuration, Symmetric and antisymmetric wave function (Bosons and Fermions). 2. Spin - Orbit interaction, Selection rules, Spectra of alkaline atom, Fine structure of Sodium D line, Spectral terms of two electron atoms, L-S and j-j coupling. Multiplicity of energy levels, Spectra of Helium atom, Zeeman effect: Types and Experimental arrangement. 3. Various types of molecular spectra, Electronic, Rotational and vibrational spectra of diatomic molecule, Raman effect: Experimental setup and explanation by quantum principle, Production of X-rays, Continuous and characteristics X- ray spectrum, Moseley's law. **Keywords/Tags:** Exclusion principle, Bosons and Fermions. Spin - Orbit interaction, Molecular spectra, X-rays.	12
4	**Solid State Physics** 1. Crystalline and amorphous solids, Space lattice: Basis, Lattice translational vector, Primitive cell, Bravais lattice. Seven crystal systems, Symmetry, Miller indices, Interplanar spacing. 2. Crystal structures: Simple cubic, Face centered cubic (NaCl), Body centred cubic (CsCl), Hexagonal closed packed. Diamond structure, Coordination numbers and atomic packing fraction, Laue's and Bragg's equations, Reciprocal lattice. 3. Dulong and Petit's theory of Specific heat, Einstein's | theory of specific heat, Debye's theory of specific heat. | Lattice vibrations in crystal: Mono-atomic lattice vibration and dispersion relation, Brillouin Zones, Concept of phonons, Lorentz Drude theory, Ohm's Law (J = oE), Wiedemann Frenz law, Hall effect. **Keywords/Tags:** Crystalline solids, Primitive cell. Crystal structures, Reciprocal lattice, Brillouin Zones.	12
5	**Semiconductor and Devices** 1. Energy bands in solids. Intrinsic and extrinsic semiconductors: Fermi energy level. Mobility, Conductivity of semiconductors, Concentration of electrons and holes in semiconductors. 2. P-N Junction, depletion layer, Potential barrier, Shockley	12

	diode equation (without derivation), Zener diode and its | application, Elementary knowledge of photodiode. Light Emitting diode and Solar cell, Bipolar Junction Transistors and its characteristic curves, Current gains (o, f and). Junction Field Effect Transistor. 3. Amplifiers and their classification. Single stage common emitter amplifier, Q-point, load line and frequency response curve, Feedback —amplifiers, Barkhausen criterion, Phase shift and Wien bridge oscillator. **Keywords/Tags:** Semiconductors, P-N Junction. Amplifiers, Oscillator.	

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Beiser A., "Concept of Modern Physics", Mc Graw Hill.
2. Ghatak, Loknathan, "Quantum Mechanics", Mc Milan.
3. Mani H.S., Mehra G.K., "Introduction to Modern Physics™, East West Press, 1989
4. Rajam J.B. "Modern Physics™, S. Chand.
5. Schiff L.1., "Quantum Mechanics", McGraw Hill Education, 4th edition, 2017.
6. White. H. E., "Introduction to Atomic spectra", McGraw Hill Education.
7. Griffiths D. J., "Introduction to Quantum Mechanics™, Cambridge University Press.
8. Kittel Charles, "Introduction to Solid State Physics", Wiley India Pvt. Ltd. India. (2007), 7" Edition.
9. Omar M. Ali, "Elementary Solid-State Physics", Pearson Education, India, (2009). 6" Edition.
10. Singhal R. L., P. A. Alvi, et. AL, "Solid State Physics™, Kedar Nath Ram Nath and Co., (2018).
11. Chattopadhyay D., Rakshit P.C., "Electronic Fundamentals and Application", New Age International, (2020).
12. Srivastava J. P., "Elements of Solid-State Physics", Prentice Hall of India, 2011, 30 edition.
13. Ashcroft Neil W., Mermin N. David., "Solid State Physics" Harcourt College \| Publishing, New York. 2019.
14. Gupta S. L.., Kumar V., "A Hand Book of Electronics", Pragati Prakashan, India, 2013, \| 19™ Edition.
15. Malvino Albert Paul, Bates David, "Electronic Principles", McGraw Hill International \| Edition, India, (2006), 7" Edition.
16. Books published by Madhya Pradesh Hindi Granth Academy, Bhopal.

Jaranjeet 12/03/2025

St. Paul Institute of Professional Studies, Indore

An Autonomous Institute Affiliated to Devi Ahilya Vishwavidhyalaya, Indore
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Phone No. 0731-2499911, 49661355, 4961356
E-mail: info@spipsindore.ac.in, Website: www.spipsindore.com

Suggested web links:

1. https://www.eshiksha.mp.gov.in/mpdhe/ Learning Management System, Departmentof higher education, Government of Madhya Pradesh (M.P.).
2. https://youtu.be/KSgzRxzhzrQ?list=PLCvpYrhOPdiX6-GqRU3e VMK ScNP4jedGiModern Physics by Prof. V. Ravishankar, IIT Delhi.
3. https:/youtu.be/THZNfDdt_w0?list=PL8g67naApM8hmh2mw 1INX4{P1663He9jtQuantum physics by H. C. Verma. IIT Kanpur
4. htips://youtu.be/xlrvgl UsKqU2list=RDCMUCLIS 11 QwKqQn0Cf4nzdGKeQQuantum Mechanics by Prof. P. Ramadevi, IIT Bombay.
5. httpsy/voutu.be/RIOCEz7wd02list=PLbMVogVj5nJQ5jqiXDYuE6ETzSF5KnddAStructure of Materials by Prof. Sandeep Sangal & Dr. Anandh Subramaniam. IITKanpur.
6. hitps://youtu.be/L-eOdZFt9BY Condensed Matter Physics by Prof. G. Rangarajan,Department of Physics. [IT Madras.
7. https://youtu.be/Kp-jS6ONHsB8?list=PLF178600D851B098F Lecture Series on SolidState Devices by Dr. S. Karmalkar, IIT Madras.
8. https:/voutu.be/g7vYop_46tU2list=PL708EEA8184FEA8FS3 Electronics by Prof.D.C. Dube, Department of Physics, IIT Delhi.

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

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Part A: Introduction

Programme: Degree Course	Class: B.Sc. III Year	Session 2025-26
Subject: Physics		
Course Code	**BS-303P**	
Course Title	Quantum Mechanics, Solid State Physics and Devices Lab (Practical)	
Course Type	Minor/Elective	
Pre-requisite	To study this course, the student must have had | | Physics as a subject in	
Course Learning Outcomes	On completion of the course, the students will be able to: 1. Determine of Planck's constant and Rydberg's | constant using different methods. 2. Determine electronic charge and specific charge of electron. 3. Determine the first excitation potential of gas (argon) by Franck Hertz experiment. 4. Use Constant deviation ~spectrometer and Fabry-Parot Interferometer.	
Credit Value	Practical – 2 credits	
Total Marks	Max. Marks: 30 + 70 Min. Passing Marks: 35	

Part B: Content of the course

Total No. of Lectures (in hours per week): 2 hours per week **Total Lectures: 30 hours**		
Unit	**List of experiments**	**No. of lectures (2 Hours Each)**
1	To determine the Rydberg's constant using hydrogen discharge tube.	30
2	To determine the Planck's constants using light emitting diode.	
3	To determine the of specific charge e/m by Thomson's method.	
4	To determine the of Plank's constant using Photo cell.	
5	To determine the first excitation potential of gas (argon) by Franck Hertz experiment.	
6	To observe the Zeeman splitting of green mercury line using Fabry-Parot Etalon for normal transverse and longitudinal configuration.	
7	To measure the wavelength of a mercury source spectrum by | constant deviation spectrograph and calibration of drum.	
8	To determine the electronic charge with the help of Millikan's oildrop method.	
9	To study the absorption spectra of iodine vapour.	
10	To draw the characteristic curves of a Photo cell and determine stopping potential.	
11	To study characteristic curve of a PN Junction diode.	
12	To study characteristics curve of a Zener diode.	
13	To study characteristics curve of a light emitting diode (LED).	
14	To determine the energy band gap of a semiconductor using P-N diode in reverse bias.	
15	To study characteristics curves of PNP/ NPN transistor in common emitter mode configuration and determination current gain.	

16	To study characteristics curves of Junction field effect transistor.	
17	To study single stage RC amplifier.	
18	To study Wien bridge oscillator.	
19	To study the characteristic curve of Photodiode.	
20	To study the characteristic curve of solar cell.	

Part C-Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Prakash 1. & Ramakrishna, "A Text Book of Practical Physics", Kitab Mahal, 201111/.
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,
12. Books published by Madhya Pradesh Hindi Granth Academy, Bhopal.

Suggested web links:

1. https://www.eshiksha.mp.gov.in/mpdhe/ Learning Management System, Department of higher education, Government of Madhya Pradesh (M.P.).
2. https://www.vlab.co.in/broad-area-physical-sciences
3. https:/storage.googleapis.com/uniquecourses/online.html
4. https:/www.vlab.co.in/broad-area-physical-sciences
5. https://storage.googleapis.com/uniquecourses/online.html

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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	**Marks**	**External Assessment**	**Marks**
Class Interaction /Quiz	**30**	Viva Voce on Practical	**70**
Attendance		Practical Record File	
Assignments (Charts/ Model Seminar / Rural Service/ Technology Dissemination/ Report of Excursion/ Lab Visits/ Survey / Industrial visit)		Table work /Experiments	
TOTAL	**Total Marks: 100**		

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