Scheme for UG Syllabus
(Effective from 2018-19)

Under

CHOICE BASED CREDIT SYSTEM (CBCS)

In

Bachelor of Science Physical Science
(Physics, Computer Science and Mathematics)

Department of Computer Science
Himachal Pradesh University
Shimla-5
CHOICE BASED CREDIT SYSTEM (CBCS):
The CBCS provides an opportunity for the students to choose courses from the prescribed
courses comprising core, elective/minor or skill based courses. The courses can be evaluated
following the grading system, which is considered to be better than the conventional marks
system. Therefore, it is necessary to introduce uniform grading system in the entire higher
education in India. This will benefit the students to move across institutions within India to
begin with and across countries. The uniform grading system will also enable potential
employers in assessing the performance of the candidates. In order to bring uniformity in
evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on
student’s performance in examinations, the UGC has formulated the guidelines to be followed.

Outline of Choice Based Credit System:

1. **Core Course:** A course, which should compulsorily be studied by a candidate as a core
   requirement is termed as a Core course.

2. **Elective Course:** Generally a course which can be chosen from a pool of courses and which
   may be very specific or specialized or advanced or supportive to the discipline/ subject of study
   or which provides an extended scope or which enables an exposure to some other
discipline/subject/domain or nurtures the candidate’s proficiency/skill is called an Elective
   Course.

   2.1 **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main
discipline/subject of study is referred to as Discipline Specific Elective. The
University/Institute may also offer discipline related Elective courses of interdisciplinary
nature (to be offered by main discipline/subject of study).

   2.2 **Dissertation/Project:** An elective course designed to acquire special/advanced knowledge,
such as supplement study/support study to a project work, and a candidate studies such a
course on his own with an advisory support by a teacher/faculty member is called
dissertation/project.

3. **Ability Enhancement Courses (AEC)/Competency Improvement Courses/Skill Development
Courses/Foundation Course:** The Ability Enhancement (AE) Courses may be of two kinds: AE
Compulsory Course (AECC) and AE Elective Course (AEEC). “AECC” courses are the
courses based upon the content that leads to Knowledge enhancement. They ((i) Environmental
Science, (ii) English/MIL (Modern Indian Language) Communication are mandatory for all
disciplines. AECC courses are value-based and/or skill-based and are aimed at providing
hands-on-training, competencies, skills, etc.

   3.1 **AE Compulsory Course (AECC):** Environmental Science, English Communication/MIL
Communication.

   3.2 **AE Elective Course (AEEC):** These courses may be chosen from a pool of courses
designed to provide value-based and/or skill-based instruction.

Project work/Dissertation is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem. A Project/Dissertation work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper.
<table>
<thead>
<tr>
<th>Year</th>
<th>Core Course (12)</th>
<th>Ability Enhancement Compulsory Course AECC (2)</th>
<th>Skill Enhancement Courses SEC (4)</th>
<th>Elective Course Discipline Specific DSE (6)</th>
<th>Total Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>DSC-1A = 6 Credit DSC-1B = 6 Credit DSC-2A = 6 Credit DSC-2B = 6 Credit DSC-3A = 6 Credit DSC-3B = 6 Credit Credits = 36</td>
<td>Environmental Science = 4 Credit Hindi/Eng./Skt = 4 Credit (One out of three)</td>
<td>NIL</td>
<td>NIL</td>
<td>44</td>
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<tr>
<td>II</td>
<td>DSC-1C = 6 Credit DSC-1D = 6 Credit DSC-2C = 6 Credit DSC-2D = 6 Credit DSC-3C = 6 Credit DSC-3D = 6 Credit Credits = 36</td>
<td>NIL</td>
<td>SEC-1 = 4 Credit SEC-2 = 4 Credit</td>
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<td>III</td>
<td>NIL</td>
<td>NIL</td>
<td>SEC-3 = 4 Credit SEC-4 = 4 Credit</td>
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<td>44</td>
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</table>

Total Credits in Bachelor of Science Physical Science (Physics, Computer Science and Mathematics)= 44 × 3

| Credits Split: | |
| Theory = 04 | Theory = 06 |
| Practical = 02 | |
Annual Examination (A.E.) and Internal Assessment (I.A.) Scheme of Three years Degree of

B.Sc. PHYSICAL SCIENCE (PHYSICS, COMPUTER SCIENCE AND MATHEMATICS)

Scheme for Examination for each course

- The medium of instructions and Examinations shall be English only.
- AE & Practical Examinations shall be conducted at the end of each year as per the Academic Calendar notified by H.P. University, Shimla-5, time to time.
- Each course of 4/6 credits (theory + Practicals) will carry 100 marks and will have following components:

  (FOR COURSES WITHOUT PRACTICALS)

  I. Theory
     Annual Examination (AE) 70 marks

  II. Internal Assessment (IA) 30 marks
     a) Assignment/Class Test/Quiz/Seminar/Model 10 marks
     b) Mid-Term Examination (One Test) 15 marks
     c) Attendance 05

  (FOR COURSES WITH PRACTICALS)

  III. Theory
       Annual Examination (AE) 50 marks

  IV. Internal Assessment (IA) 30 marks
     a) Assignment/Class Test/Quiz/Seminar/Model 10 marks
     c) Mid-Term Examination (One Test) 15 marks
     d) Attendance 05

  V. Practical
     Practical examination will have following components:
     a) Performing the two practical exercises assigned by the Examiner in terms of requirement of chemicals/Practical’s/Theory/reaction (if any) involved, procedure/scheme/Observations/calculations and results. 7.5 + 7.5 marks
     b) Viva-voce examinations 5 marks
     c) Practical note book 5 marks

5
d) Regularity during practical classes 5 marks

- Minimum Pass Percentage in each component (AE, IA & Practical) shall be 40%, separately
- Criterion for Class-room attendance (05 marks) 75% Attendance is minimum eligibility condition.

i) Attendance ≥75% but < 80% 1 mark
ii) Attendance ≥ 80% but < 85% 2 marks
iii) Attendance ≥ 85% but < 90% 3 marks
iv) Attendance ≥ 90% but < 95% 4 marks
v) Attendance ≥ 95% 5 marks
## B.Sc. PHYSICAL SCIENCE (PHYSICS, COMPUTER SCIENCE AND MATHEMATICS)

**HIMACHAL PRADESH UNIVERSITY**

**SYLLABUS AND SCHEME OF EXAMINATION FOR B.Sc. PHYSICAL SCIENCE (PHYSICS, COMPUTER SCIENCE AND MATHEMATICS)**

*(Effective from 2018-19 onwards)*

<table>
<thead>
<tr>
<th>COURSE OPTED</th>
<th>COURSE NAME</th>
<th>COURSE CODE</th>
<th>CR-EDITION</th>
<th>ESE (THEORY)</th>
<th>CCA (IA)</th>
<th>TOTAL MARKS</th>
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<tbody>
<tr>
<td><strong>1st YEAR</strong></td>
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<tr>
<td>Core course-I</td>
<td>Mechanics Theory</td>
<td>PHYS101TH</td>
<td>4</td>
<td>50</td>
<td>30</td>
<td>80</td>
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<td></td>
<td>Mechanics Lab</td>
<td>PHYS101IA</td>
<td>2</td>
<td>20</td>
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<tr>
<td>Core Course-II</td>
<td>Problem Solving Using Computer</td>
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<td>Software Lab Using Python</td>
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<td>Theory Of Equations</td>
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<td>Mathematical Finance</td>
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<td>Boolean Algebra</td>
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<td>SEC 4</td>
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Total Credits 132

TH = Theory, IA = Internal Assessment, PR = Practical, TU = Tutorials and SE = Skill Exam

SEC 4 Anyone from either math/physics/computer

Computer Science

COMP303TH Software Engineering
COMP101TH: Problem Solving using Computer

Unit-I
Basic Computer Organization: Units of a computer, CPU, ALU, memory hierarchy, registers, I/O devices.

Unit-II
Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.
Techniques of Problem Solving: Flowcharting, decision table, algorithms, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

Unit-III
Overview of Programming: Structure of a Python Program, Elements of Python
Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).
Creating Python Programs: Input and Output Statements, Control statements (Looping-while Loop, for Loop , Loop Control, Conditional Statement- if...else, Difference between break, continue and pass).

Unit-IV
Structures: Numbers, Strings, Lists, Tuples, Dictionary, Date & Time, Modules, Defining Functions, Exit function, default arguments.
Introduction to Advanced Python: Objects and Classes, Inheritance, Regular Expressions, Event Driven Programming, GUI Programming.

Reference Books:
3. T. Budd, Exploring Python, TMH, 1st Ed, 2011
4. Python Tutorial/Documentation www.python.or 2010
5. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : learning with Python , Freely available online.2012
COMP101PR: Software Lab using Python

**Section: A (Simple programs)**
1. Write a menu-driven program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user’s choice.
2. WAP to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
   - Grade A: Percentage >=80
   - Grade B: Percentage >=70 and <80
   - Grade C: Percentage >=60 and <70
   - Grade D: Percentage >=40 and <60
   - Grade E: Percentage <40
3. Write a menu-driven program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
4. WAP to display the first n terms of Fibonacci series.
5. WAP to find factorial of the given number.
6. WAP to find sum of the following series for n terms: $1 - 2/2! + 3/3! - - - - - n/n!$
7. WAP to calculate the sum and product of two compatible matrices.

**Section: B (Visual Python):**
*All the programs should be written using user defined functions, wherever possible.*

1. Write a menu-driven program to create mathematical 3D objects:
   - I. Curve
   - II. Sphere
   - III. Cone
   - IV. Arrow
   - V. Ring
   - VI. Cylinder
2. WAP to read n integers and display them as a histogram.
3. WAP to display sine, cosine, polynomial and exponential curves.
4. WAP to plot a graph of people with pulse rate p vs. height h. The values of p and h are to be entered by the user.
5. WAP to calculate the mass m in a chemical reaction. The mass m (in gms) disintegrates according to the formula $m=60/(t+2)$, where t is the time in hours. Sketch a graph for t vs. m, where t>=0.
6. A population of 1000 bacteria is introduced into a nutrient medium. The population p grows as follows:
   \[ P(t) = \frac{(15000(1+t))}{(15+ e)} \]
   where the time t is measured in hours. WAP to determine the size of the population at given time t and plot a graph for P vs t for the specified time interval.
COMP102TH: Office Automation Tools

Unit-I
Introduction to open office/MS office/Libre office

Unit-II
Word Processing: Formatting Text, Pages, Lists, Tables

Unit-III
Spreadsheets: Worksheets, Formatting data, creating charts and graphs, using formulas and functions, macros, Pivot Table

Unit-IV
Presentation Tools: Adding and formatting text, pictures, graphic objects, including charts, objects, formatting slides, notes, hand-outs, slide shows, using transitions, animations

Books Recommended:

COMP102PR: Office Automation Tools Lab

Word Processing
1. Prepare a grocery list having four columns (Serial number, The name of the product, quantity and price) for the month of April, 06.
   - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
   - The headings of the columns should be in 12-point and bold.
   - The rest of the document should be in 10-point Times New Roman.
   - Leave a gap of 12-points after the title.
2. Create a telephone directory.
   - The heading should be 16-point Arial Font in bold
   - The rest of the document should use 10-point font size
   - Other headings should use 10-point Courier New Font.
   - The footer should show the page number as well as the date last updated.
3. Design a time-table form for your college.
   - The first line should mention the name of the college in 16-point Arial Font and should be bold.
   - The second line should give the course name/teacher's name and the department in 14-point Arial.
   - Leave a gap of 12-points.
   - The rest of the document should use 10-point Times New Roman font.
   - The footer should contain your specifications as the designer and date of creation.
4. BPB Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.
   - The title of the book should appear in bold using 20-point Arial font.
   - The name of the author and his qualifications should be in the center of the page in 16-point Arial font.
   - At the bottom of the document should be the name of the publisher and address in 16-point Times New Roman.
   - The details of the offices of the publisher (only location) should appear in the footer.
5. Create the following one page documents.
   a. Compose a note inviting friends to a get-together at your house, Including a list of things to bring with them.
   b. Design a certificate in landscape orientation with a border around the document.
   c. Design a Garage Sale sign.
   d. Make a sign outlining your rules for your bedroom at home, using a numbered list.
6. Create the following documents:
   (a) A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.
   (b) Use a newsletter format to promote upcoming projects or events in your classroom or college.

Spread Sheet
1. Given the following worksheet

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Roll No.</td>
<td>Name</td>
<td>Marks</td>
</tr>
<tr>
<td>2</td>
<td>1001</td>
<td>Sachin</td>
<td>99</td>
</tr>
<tr>
<td>3</td>
<td>1002</td>
<td>Sehwag</td>
<td>65</td>
</tr>
</tbody>
</table>
Calculate the grade of these students on the basis of following guidelines:

<table>
<thead>
<tr>
<th>Marks</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;= 80</td>
<td>A+</td>
</tr>
<tr>
<td>&gt;= 60 &lt; 8</td>
<td>A</td>
</tr>
<tr>
<td>&gt;= 50 &lt; 60</td>
<td>B</td>
</tr>
<tr>
<td>&lt; 50</td>
<td>F</td>
</tr>
</tbody>
</table>

2. Given the following worksheet

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Salesman</td>
<td>Sales in (Rs.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>No.</td>
<td>Qtr1</td>
<td>Qtr2</td>
<td>Qtr3</td>
<td>Qtr4</td>
<td>Total</td>
<td>Commission</td>
</tr>
<tr>
<td>3</td>
<td>S001</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
<td>5000</td>
</tr>
<tr>
<td>4</td>
<td>S002</td>
<td>7000</td>
<td>7000</td>
<td>7000</td>
<td>7000</td>
<td>7000</td>
<td>7000</td>
</tr>
<tr>
<td>5</td>
<td>S003</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>4000</td>
</tr>
<tr>
<td>6</td>
<td>S004</td>
<td>5500</td>
<td>5500</td>
<td>5500</td>
<td>5500</td>
<td>5500</td>
<td>5500</td>
</tr>
<tr>
<td>7</td>
<td>S005</td>
<td>7400</td>
<td>7400</td>
<td>7400</td>
<td>7400</td>
<td>7400</td>
<td>7400</td>
</tr>
<tr>
<td>8</td>
<td>S006</td>
<td>5300</td>
<td>5300</td>
<td>5300</td>
<td>5300</td>
<td>5300</td>
<td>5300</td>
</tr>
</tbody>
</table>

Calculate the commission earned by the salesmen on the basis of following candidates:

<table>
<thead>
<tr>
<th>If Total Sales</th>
<th>Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20000</td>
<td>0% of sales</td>
</tr>
<tr>
<td>&gt; 20000 and &lt; 25000</td>
<td>4% of sales</td>
</tr>
<tr>
<td>&gt; 25000 and &lt; 30000</td>
<td>5.5% of sales</td>
</tr>
<tr>
<td>&gt; 30000 and &lt; 35000</td>
<td>8% of sales</td>
</tr>
<tr>
<td>&gt;= 35000</td>
<td>11% of sales</td>
</tr>
</tbody>
</table>

The total sale is sum of sales of all the four quarters.

1. A company XYZ Ltd. pays a monthly salary to its employees which consists of basic salary, allowances & deductions. The details of allowances and deductions are as follows:

**Allowances**

- HRA Dependent on Basic
  - 30% of Basic if Basic <=1000
  - 25% of Basic if Basic>1000 & Basic<=3000
  - 20% of Basic if Basic >3000

- DA Fixed for all employees, 30% of Basic

- Conveyance Allowance Rs. 50/- if Basic is <=1000
  - Rs. 75/- if Basic >1000 & Basic<=2000
  - Rs. 100 if Basic >2000

- Entertainment Allowance NIL if Basic is <=1000
  - Rs. 100/- if Basic >1000

**Deductions**

- Provident Fund 6% of Basic
B.Sc. PHYSICAL SCIENCE (PHYSICS, COMPUTER SCIENCE AND MATHEMATICS)

Group Insurance Premium
Rs. 40/- if Basic is <=1500
Rs. 60/- if Basic > 1500 & Basic<=3000
Rs. 80/- if Basic >3000

Calculate the following:
Gross Salary = Basic + HRA + DA + Conveyance + Entertainment
Total deduction = Provident Fund + Group Insurance Premium
Net Salary = Gross Salary – Total Deduction

Presentation Tool
1. Apply the Banded Design theme to all slides.
2. On Slide 1, add your name in the subtitle text box; change the subtitle text font size to 36 pts.
3. Center align the title and subtitle on Slide 1; change the title text to Californian FB font, 54 pts., Italic.
4. Format the title text on Slide 2 to bold, text shadow effect, font size 48 pts.
5. On the Banded Slide Master, insert the picture “Logo” in the Computer Technology>PowerPoint folder on the student drive.
6. Resize the image to exactly 1 inch in width and position the image in the lower left corner of the slide so the border of the image rest on the bottom and lower left edges of the slide.
7. On the Title and Text Layout slide master, center align the text in the title placeholder. Close Slide Master view.
8. Change the slide layout of Slide 2 to Two Content. In the right placeholder, insert an appropriate online picture using the keyword computer.
9. Resize the image on Slide 2 to be 2.5 inches in height.

17
COMP201TH: Computer System Architecture

Unit-I
Introduction: Logic gates, Boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexors, registers, counters and memory units.
Data Representation and basic Computer Arithmetic: Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison.

Unit-II
Basic Computer Organization and Design: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt.
Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, micro programmed control.

Unit-III
Programming the Basic Computer: Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming.

Unit-IV
Input-output Organization: Peripheral devices, I/O interface, Modes of data transfer, direct memory access.

Books Recommended:
2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
COMP202TH: Database Management System

Unit-I
Introduction to Database Management Systems: Characteristics of database approach, data models, DBMS architecture and data independence.

Unit-II

Unit-III
Relational Data Model: Basic concepts, relational constraints, relational algebra, SQL queries.

Unit-IV
Database design: ER and EER to relational mapping functional dependencies, normal forms up to third normal form.

Books Recommended:
COMP202PR: Database Management System Lab

Note: My Access/MySQL may be used.

The following concepts must be introduced to the students:

**DDL Commands**
- Create table, alter table, drop table

**DML Commands**
- Select, update, delete, insert statements
- Condition specification using Boolean and comparison operators (and, or, not, =, <>, >, <, >=, <=)
- Arithmetic operators and aggregate functions (Count, sum, avg, Min, Max)
- Multiple table queries (join on different and same tables)
- Nested select statements
- Set manipulation using (any, in, contains, all, not in, not contains, exists, not exists, union, intersect, minus, etc.)
- Categorization using group by, having

Arranging using order by
COMP203TH: PHP Programming

Unit-I
Introduction to PHP: PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.), PHP with other technologies, scope of PHP, Basic Syntax, PHP variables and constants, Types of data in PHP, Expressions, scopes of a variable (local, global), PHP Operators: Arithmetic, Assignment, Relational, Logical operators, Bitwise, ternary and MOD operator, PHP operator Precedence and associativity.

Unit-II
Handling HTML form with PHP: Capturing Form Data, GET and POST form methods, Dealing with multi value fields, Redirecting a form after submission
PHP conditional events and Loops: PHP IF Else conditional statements (Nested IF and Else), Switch case, while, For and Do While Loop, Goto, Break, Continue and exit

Unit-III
PHP Functions: Function, Need of Function, declaration and calling of a function, PHP Function with arguments, Default Arguments in Function, Function argument with call by value, call by reference, Scope of Function Global and Local
Array: Anatomy of an Array, Creating index based and Associative array, Accessing array, Looping with Index based array, with associative array using each() and foreach(), Some useful Library function.

Unit-IV
String Manipulation and Regular Expression: Creating and accessing String, Searching & Replacing String, Formatting, joining and splitting String, String Related Library functions, Use and advantage of regular expression over inbuilt function, Use of preg_match(), preg_replace(), preg_split() functions in regular expression

Books Recommended:

2. Timothy Boronczyk, Martin E. Psinas, "PHP and MYSQL (Create-Modify-Reuse)", Wiley India Private Limited, 2008.
COMP301TH: Operating System

Unit-I

**Introduction:** System Software, Resource Abstraction, OS strategies.

**Types of operating systems** - Multiprogramming, Batch, Time Sharing, Single user and Multiuser, Process Control & Real Time Systems.

Unit-II

**Operating System Organization:** Factors in operating system design, basic OS functions, implementation consideration; process modes, methods of requesting system services – system calls and system programs.

**Process Management:** System view of the process and resources, initiating the OS, process address space, process abstraction, resource abstraction, process hierarchy, Thread model

**Scheduling:** Scheduling Mechanisms, Strategy selection, non-pre-emptive and pre-emptive strategies.

Unit-III

**Memory Management:** Mapping address space to memory space, memory allocation strategies, fixed partition, variable partition, paging, virtual memory.

Unit-IV

**Shell introduction and Shell Scripting:** shell and various type of shell, Various editors present in Linux, Different modes of operation in vi editor, What is shell script, Writing and executing the shell script, Shell variable (user defined and system variables), System calls, Using system calls

Text Book:

Reference Books:
COMP302TH: Data Structure and File Processing

Unit-I

Basic Data Structures: Abstract data structures- stacks, queues, linked lists and binary trees. Binary trees, balanced trees.

Unit-II

Searching: Internal and external searching, Memory Management: Garbage collection algorithms for equal sized blocks, storage allocation for objects with mixed size.

Unit-III

Physical Devices: Characteristics of storage devices such as disks and tapes, I/O buffering. Basic File System Operations: Create, open, close, extend, delete, read-block, write-block, protection mechanisms.

Unit-IV

File Organizations: Sequential, indexed sequential, direct, inverted, multi-list, directory systems, Indexing using B-tree, B+ tree.

Books Recommended:

COMP320PR: Data Structure and File Processing Lab

1. Write a program to implement PUSH and POP operations of stack using arrays.

2. Implement Singly Link List programs - for Insertion, Deletion, searching and traversing.

3. Write a program to implement PUSH and POP operations of stack using Link list.

4. Write a program to implement Binary Tree using Link List.

5. Write a program to count the number of nodes in a link list.

6. Implement Queue programs – for insertion and deletion using arrays.

7. Implement Queue programs – for insertion and deletion using Link List.

8. Write a program to delete duplicate elements from an array of 20 integers.

9. Write a program to implement linear search.

10. Write a program to implement binary search.
COMP303TH: Software Engineering

Unit-I

**Software Process:** Introduction, S/W Engineering Paradigm, life cycle models (water fall, incremental, spiral, evolutionary, prototyping, object oriented), System engineering, computer based system, verification, validation, life cycle process, development process, system engineering hierarchy.

**Software requirements:** Functional and non-functional, user, system, requirement engineering process, feasibility studies, requirements, elicitation, validation and management, software prototyping, prototyping in the software process, rapid prototyping techniques, user interface prototyping, S/W document. Analysis and modeling, data, functional and behavioral models, structured analysis and data dictionary.

Unit-II

**Design Concepts and Principles:** Design process and concepts, modular design, design heuristic, design model and document, Architectural design, software architecture, data design, architectural design, transform and transaction mapping, user interface design, user interface design principles. Real time systems, Real time software design, system design, real time executives, data acquisition system, monitoring and control system.

Unit-III

**Software Configuration Management:** The SCM process, Version control, Change control, Configuration audit, SCM standards.

**Software Project Management:** Measures and measurements, S/W complexity and science measure, size measure, data and logic structure measure, information flow measure. Estimations for Software Projects, Empirical Estimation Models, Project Scheduling.

Unit-IV

**Testing:** Taxonomy of software testing, levels, test activities, types of s/w test, black box testing, testing boundary conditions, structural testing, test coverage criteria based on data flow, mechanisms, regression testing, testing in the large. S/W testing strategies, strategic approach and issues, unit testing, integration testing, validation testing, system testing and debugging.

**Trends in Software Engineering:** Reverse Engineering and Re-engineering – wrappers – Case Study of CASE tools.

**Books Recommended:**
1. Roger S. Pressman, Software engineering - A practitioner’s Approach, McGraw-Hill