

S.Y.B.Sc.(I.T.) – Semester III
MODERN OPERATING SYSTEMS

(Time: 2 hours)

Total Marks: 60

N. B.: (1) All questions are compulsory.
 (2) Make suitable assumptions wherever necessary and state the assumptions made.
 (3) Answers to the same question must be written together.
 (4) Numbers to the right indicate marks.
 (5) Draw neat labeled diagrams wherever necessary.
 (6) Use of Non-programmable calculators is allowed.

1. Attempt any three of the following:

a. Explain CLI (Command Line Interface) and GUI (Graphical User Interface). 15
 b. What is a monolithic kernel? State its advantages and disadvantages.
 c. Draw and explain the five-state process model.
 d. Write a short note on process creation and process termination.
 e. Define a thread. Differentiate between single-threaded and multi-threaded processes.
 f. Write a short note on basic thread functionality.

2. Attempt any three of the following:

a. How does Peterson's algorithm use turn and flag variables to achieve mutual exclusion? 15
 b. Define semaphore. Explain general semaphore with an example.
 c. What are monitors? Explain in detail with its appropriate syntax.
 d. List and briefly explain the four necessary conditions for deadlock.
 e. Suggest solution to the Dining Philosophers Problem.
 f. Assume that there are 5 processes, P0 through P4, and 4 types of resources. At T0 we have the following system state

	Allocation			Claim			Need			Available		
	A	B	C	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3				3	3	2
P1	2	0	0	3	2	2						
P2	3	0	2	9	0	2						
P3	2	1	1	2	2	2						
P4	0	0	2	4	3	3						

i. Calculate the content of the need matrix?

ii. Check if the system is in a safe state?

3. Attempt any three of the following:

a. Explain dynamic partitioning with a neat diagram.
 b. Given memory blocks of size 100KB, 500KB, 200KB, 300KB, 600KB and processes of size 212KB, 417KB, 112KB, 426KB, show allocation using Next Fit.
 c. State and explain the principle of locality.
 d. Solve the following using Optimal replacement policy with 3 frames:
 Reference string = 1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5
 e. Define CPU scheduling. Explain the different types of scheduling algorithm in an OS.
 f. Four processes arrived at time 0s with burst times: P1 = 6, P2 = 8, P3 = 7, P4 = 3. Using non-preemptive SJF/SPN, calculate average waiting time and turnaround time.

4. Attempt any three of the following:

a. Draw and explain the general architecture of a file system.
 b. What is record blocking? Explain record blocking methods.
 c. What is a buffer overflow attack? Give an example.
 d. What is DAC? Give an example of how it works in a file system.
 e. Explain different types of I/O devices with examples.
 f. Consider a disk queue with requests for I/O to blocks on cylinders 55, 58, 39, 18, 90, 160, 150, 38, 184. The head is initially at cylinder 50. The cylinders are numbered from 0 to 199. Using First Come First Serve (FCFS) scheduling algorithm, calculate the total head movement.

15

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S.Y.B.Sc.(I.T.) – Semester III
NETWORK ARCHITECTURE AND PROTOCOLS
(Time: 2 hours)

Total Marks: 60

Date 01/10/2025

N. B.: (1) All questions are compulsory.
(2) Make suitable assumptions wherever necessary and state the assumptions made.
(3) Answers to the same question must be written together.
(4) Numbers to the right indicate marks.
(5) Draw neat labeled diagrams wherever necessary.
(6) Use of Non-programmable calculators is allowed.

1. **Attempt any three of the following:** 15

- a. What is a topology? Explain any one topology with a suitable diagram.
- b. Explain the Network Router device.
- c. Write a short note on LAN.
- d. Draw a diagram of the TCP/IP layer and explain the transport and Internet layers.
- e. Discuss the Modem device.
- f. Define the concept of a computer network and explain its need.

2. **Attempt any three of the following:** 15

- a. Write the Key Differences Between Analog and Digital Signals.
- b. Discuss Serial Transmission with a suitable theory.
- c. Explain the parity check error detection technique.
- d. Write a short note on types of Transmission Impairment.
- e. Discuss FEC methods with a suitable diagram.
- f. Explain the concept of Error with its types.

3. **Attempt any three of the following:** 15

- a. What is the switching concept? Explain the Implementation of Connection-Oriented Service?
- b. Explain the Internet Control Message Protocol with its Error-Reporting Messages.
- c. What are Routing Algorithms? Explain the classification of the Routing Algorithms.
- d. Discuss the Path Vector Routing Algorithm with a suitable example.
- e. Discuss Border Gateway Protocol.
- f. Write a short note on the Address Resolution Protocol.

4. **Attempt any three of the following:** 15

- a. Explain the TCP protocol with its Key Services and Functions.
- b. Discuss the DNS protocol.
- c. Write a short note on Telnet.
- d. Write a short note on the Go-Back-N protocol.
- e. Explain the POP3 protocol.
- f. Discuss the UDP protocol with its key characteristics and functions.

S.Y.B.Sc.(D.S.) – Semester III
ROBOTIC PROCESS AUTOMATION PROCESS
(Time: 2 hours)

Total Marks: 60

N. B.: (1) All questions are compulsory.
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(4) Numbers to the right indicate marks.
(5) Draw neat labeled diagrams wherever necessary.
(6) Use of Non-programmable calculators is allowed.

1. Attempt any three of the following:

a. List benefits of RPA and explain any one in detail. 15
b. Identify two RPA components and briefly explain their functions.
c. Explain the importance of process assessment before RPA implementation.
d. Analyze the strengths and weaknesses of designing a workflow using only Sequences.
e. Evaluate with the help of an example how Do While and For Each loops works in UiPath.
f. Create a decision-making logic in UiPath to check if a user login is successful. What activities will you use and why?

2. Attempt any three of the following:

a. Explain how the scope of a variable affects its accessibility in a workflow. 15
b. Differentiate between variables and arguments with suitable example.
c. Design a small workflow to read data from Excel, manipulate it using a data table, and save it back to CSV
d. Recall the types of extensions UiPath supports for browser automation.
e. Analyze a case which discusses importance of credential management
f. Develop a guide for installing and configuring all required UiPath extensions for Chrome, Firefox, and Java.

3. Attempt any three of the following:

a. What are Assistant Bots in UiPath, and where are they commonly used?
b. Illustrate how monitoring emails can be automated using UiPath triggers.
c. Critique a scenario where too many triggers are used in a workflow. What problems can it create?
d. List any three common exceptions that may occur in UiPath workflows.
e. Define different debugging techniques and breakpoints.
f. Differentiate between Throw, Re-throw and Try-catch block

4. Attempt any three of the following:

a. List the three main workflow types in UiPath and give one use case for each.
b. Analyze how the absence of comments can lead to confusion during workflow handover.
c. List any three best practices for organizing a UiPath project folder.
d. Explain the step-by-step process of publishing a workflow using the Publish utility.
e. Explain how Orchestrator helps in managing robots and processes.
f. What are the different types of robots that can be controlled using Orchestrator?

S.Y.B.Sc. (I.T.) NEP – Semester III
PROGRAMMING WITH PYTHON

(Time: 2 hours)

01/10/2025 Regular

Total Marks: 60

N. B.: (1) All questions are compulsory.
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(4) Numbers to the right indicate marks.
(5) Draw neat labeled diagrams wherever necessary.
(6) Use of Non-programmable calculators is allowed.

1. Attempt any three of the following:

a. Write a short note on the Python language. Explain the history of the Python language.

b. What is a variable? How are variables created in Python? Explain the rules for variable names and implicit type conversion.

c. Define operators and operands. Explain the membership and identity operators with examples in Python.

d. Explain the for statement with its syntax in Python. Write a Python program to generate the following output using a for loop:

@
@@
@@@
@@@@
@@@@@

e. What is a function? How are functions defined and called in Python? Explain with syntax.

f. Write a Python program to accept a string from the user and check whether it is a palindrome, using a Boolean function. Give the working table of the program.

2. Attempt any three of the following:

a. Explain string traversal with loops and the concept of immutability of strings in Python.

b. Explain list mutability in Python with suitable examples.

c. What is a tuple in Python? How are tuple elements assigned and accessed in Python?

d. Explain the following built-in dictionary functions in Python with suitable examples:
i) len() ii) values() iii) setdefault() iv) popitem()

e. Explain the functions with syntax for the following in Python:
i) File Position ii) Reading Lines iii) Renaming and Deleting Files

f. Write a Python program to merge the contents of two text files into a list.

3. Attempt any three of the following:

a. Explain the following regular expression functions in Python:
i) search() ii) end() iii) sub()

b. What is a class? How is it defined in Python? Write a Python program to create a class without a constructor.

c. Write a Python program to demonstrate Data Hiding in classes.

d. Explain the following concepts in Python:
i) except block with no exceptions ii) finally block in exceptions
iii) raising an exception

e. What is a thread? Explain the functions in the queue module of Python.

f. Explain the time tuple in Python.

15

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S.Y.B.Sc. (I.T.) NEP – Semester III
PROGRAMMING WITH PYTHON

4. Attempt any three of the following: 15

- a. What is a place layout? List and explain the options of the place layout.
- b. What is a LabelFrame? How is it created? Explain its properties.
- c. Write a Python program to create a MenuButton with the text “File”. The MenuButton should appear raised, and the menu should open on the right-hand side. The menu should have two options – New and Exit. Open a new window when the user selects New and close the master window when user selects Exit.
- d. What is a Checkbutton widget? How is it created? Explain any six properties of the Checkbutton widget.
- e. What is a cursor object? How is it created? How are queries executed using the cursor object? What are the different ways of retrieving rows in Python?
- f. Write a Python program in CLI mode to accept the Employee ID from the user and display other details from the Employee table (eid, ename, age, dept). Display a message “No data found” if employee id does not exist in the table.

S.Y.B.Sc.(D.S.) – Semester III
DATA WAREHOUSING
(Time: 2 hours)

Total Marks: 60

N. B.: (1) All questions are compulsory.
(2) Make suitable assumptions wherever necessary and state the assumptions made.
(3) Answers to the same question must be written together.
(4) Numbers to the right indicate marks.
(5) Draw neat labeled diagrams wherever necessary.

1. **Attempt any three of the following:** 15

- a. Explain the Purpose and Importance of Data Warehousing.
- b. Explain the following key Characteristics of a Data Warehouse
 - 1. Subject-oriented
 - 2. Time-Variant
- c. Write a short note on the concept of a Dependent Data Mart for Customer Data.
- d. State the difference between OLTP and OLAP.
- e. Explain Data Modeling for Data Warehousing?
- f. Discuss the Layer Architecture of the Data Warehouse.

2. **Attempt any three of the following:** 15

- a. Explain Normalization in Data Warehousing with an example.
- b. Write steps include in creation of Galaxy Schema using following schema
 - Fact Tables: Sales_Fact, Shipping_Fact.
 - Shared Dimension Table: Time_Dim, Product_Dim, Customer_Dim
- c. Define Hierarchies Dimension Tables.
- d. Write a short note on implementing a junk dimension with an example.
- e. Discuss SCD with its Types 2.
- f. What is the Foreign Key concept in the Fact table? Explain with an example.

3. **Attempt any three of the following:** 15

- a. Explain Bulk Loading with an example.
- b. Differentiate between Incremental Loads and Full Loads.
- c. Explain Staging process with following ETL phase using Employee Table
 - 1.Extract
 - 2.Transform
 - 3. Load
- d. Explain the Filtering technique used in the data warehouse with an example.
- e. Write a short note on the SSIS Platform.
- f. Define the Data Cleansing component in the ETL Pipeline.

4. **Attempt any three of the following:** 15

- a. Define the Hybrid Approach used for designing a data warehouse.
- b. Define the OLAP cube with the following factors
 - 1. Structure
 - 2. Dimensions
- c. Discuss ROLAP with an example.
- d. Write a short note on Techniques for Securing Data.
- e. Explain Data Partitioning? write a partition query based on a column like Date.
Table name: Product_info
Column:
Product_id, Date, Region, Product_name, Units_Sold, Revenue
- f. What kind of security challenges are available in a Data warehouse?

S. Y. B. Sc. (I.T.) – Semester III (NEP)
SUBJECT: PRINCIPLES OF LINEAR ALGEBRA

(Time: 1 hour)

04/11/2025

Total Marks: 30

N. B.:

- (1) All questions are compulsory.
- (2) Make suitable assumptions wherever necessary and state the assumptions made.
- (3) Answers to the same question must be written together.
- (4) Numbers to the right indicate marks.
- (5) Draw neat labeled diagrams wherever necessary.
- (6) Use of Non-programmable calculators is allowed.

1. Attempt any three of the following:

15

- a. Discuss the consistency of following system of equation & hence, find its solution if it is consistent: $x + 2y - z = 1, 2x + 3y - 3z = -1, 3x + 5y - 2z = 4$
- b. Determine whether vectors $u_1 = (1, 3, 4), u_2 = (2, 4, 6), u_3 = (1, 1, 2)$ are linearly independent or linearly dependent. If they are linearly dependent find the relation between them.
- c. Use distance formula to prove that points $a = (-2, 3, 5), b = (1, 2, 3)$ & $c = (7, 0, -1)$ are collinear.
- d. If $u = (1, 5, -1), v = (3, 1, 2)$ & $w = (2, 1, 3)$ are given vectors then find
 - i) $u \times v$
 - ii) $v \times w$
 - iii) $u \times (v \times w)$
- e. Express the vector $v = (6, 3, 9)$ as linear combination of vectors $u_1 = (1, 2, 1), u_2 = (1, -1, 1), u_3 = (1, 1, 2)$
- f. Test the consistency of following system of equation & hence find its solution if it is consistent: $x + y - 2z + w = 0, 2x + y + z + 3w = 0, 3x + 2y - z + 4w = 0$

2. Attempt any three of the following:

15

- a. Verify Cayley Hamilton Theorem for the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 2 \\ 3 & 2 & 1 \end{bmatrix}$
- b. Determine whether $A = \begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$ is diagonalizable or non-diagonalizable. If it is diagonalizable, find transforming matrix P & diagonal matrix D
- c. Let $A(2,4), B(4,6), C(4,2)$ are vertices of ΔABC .
 - i) Find the reflection of ΔABC about y-axis.
 - ii) Reduce the size of ΔABC by 2 units.
- d. Let $T: R^3 \rightarrow R^2$ be transformation defined by $T(x, y, z) = (2x + 2y, y + 3z)$. Prove that it is linear transformation.
- e. Find the eigen values of $12A^{-1} & adj(A)$ if $A = \begin{bmatrix} 8 & -8 & -2 \\ 4 & -3 & -2 \\ 3 & -4 & 1 \end{bmatrix}$
- f. If $u = (1, 2, -1, 0, 4), v = (2, 0, 4, -3, 2), w = (1, 3, 2, 1, 1)$ are given vectors then prove that $\langle 2u + 3v, w \rangle = 2\langle u, w \rangle + 3\langle v, w \rangle$

Date: 16/10/25

S.Y.B.Com. I.T. – Semester III
शासकीय मराठी - १
(Time: 60 min)

Total Marks: 30

Instructions:

1. Q.1 is Compulsory.
2. Attempt any 2 from Q. 2 to Q.4
3. Figures to the right-hand side indicate full marks.

१. खालील प्रश्नाचे सविस्तर उत्तर लिहा.

10

माहितीचा अधिकार म्हणजे काय ते सांगून महितीच्या अधिकाराबद्दल सविस्तर माहिती लिहा.

२. खालील प्रश्नाचे उत्तर लिहा.

अ. आदेश म्हणजे काय ? आदेशाचे उद्देश लिहा.

5

ब. मुंबई शहरातील कचरा व्यवस्थापनासाठी ठाराव लेखन सादर करा.

5

३. खालील प्रश्नाचे उत्तर लिहा.

अ. अनुच्छेद ३४४ ची माहिती लिहा

5

ब. वार्षिक अहवाल म्हणजे काय वार्षिक अहवालाचे महत्त्व स्पष्ट करा.

5

४. खालील प्रश्नाचे उत्तर लिहा.

अ. संक्षिप्तलेखन म्हणजे काय संक्षिप्तलेखनाची तंत्रे लिहा.

5

ब. महाराष्ट्र राज्य परीक्षा परिषद पुणे-१ कडून शिक्षक अभियोग्यता व बुद्धिमत्ता चाचणी परीक्षेच्या निकालाचे निवेदन सादर करा.

5

S.Y.B.Sc. (I.T.) – Semester III
Entrepreneurship Management

(Time: 1 hour)

14/10/2025

Total Marks: 30

N. B.: (1) All questions are compulsory.
(2) Make suitable assumptions wherever necessary and state the assumptions made.
(3) Answers to the same question must be written together.
(4) Numbers to the right indicate marks.
(5) Draw neat, labeled diagrams wherever necessary.
(6) Use of Non-programmable calculators is allowed.

1. Attempt any three of the following: 15

- a. Explain briefly the barriers to entrepreneurship.
- b. Discuss in brief the factors affecting entrepreneurial management
- c. Explain in brief the development of business plan
- d. Write a note on Theory of Social change
- e. What is socio cultural influence on entrepreneurial development?
- f. Write a note on Incubation Centre

2. Attempt any three of the following: 15

- a. Describe in brief problems of women entrepreneurs
- b. Discuss the importance of social entrepreneurship
- c. Explain shortly the options available to entrepreneurs
- d. What are the factors influencing Entrepreneurship Development Program?
- e. Discuss the different types of Intellectual Property Rights
- f. What are the strategies for growth of Entrepreneurship?