EVEN 2025-26 CO19R204/CO19206

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : CO/IF Engineering
Course Title : Operating System

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define an operating system. **[CO-1, L-R]**
b. Define file management in operating system. **[CO-2, L-R]**
c. List out operating system components. **[CO-2, L-R]**
d. Define : i. User Thread ii. Kernel Thread. **[CO-3, L-R]**
e. Define Deadlock. **[CO-4, L-R]**
f. List types of scheduling. **[CO-4, L-R]**
g. State the concept of paging. **[CO-5, L-R]**
h. State the concept of swapping. **[CO-5, L-R]**
i. List out the types of file system structure. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain : i. Multiprocessor Operating System ii. Distributed Operating System. **[CO-1, L-U]**
b. Write a program to copy one file into another file using different system calls. **[CO-2, L-A]**
c. Describe Layered Operating System structure with diagram. **[CO-2, L-U]**
d. Explain Multithreading Models in detail. **[CO-3, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. What is Inter-Process communication? Explain shared memory system and message passing system in detail. **[CO-3, L-R]**
b. Explain contiguous memory allocation and fragmentation in detail. **[CO-5, L-U]**
c. Explain bankers algorithm with example. **[CO-4, L-A]**
d. Explain contiguous file allocation method in detail. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. State the role of operating system. **[CO-1, L-U]**
b. Explain operating system services in detail. **[CO-2, L-U]**
c. Explain scheduling criteria. **[CO-4, L-U]**
d. List out types of access method in file system. Describe any one. **[CO-6, L-R]**
e. What is file system? List out types of file system. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Write a program to implement optimal page replacement (OPT) algorithm. Calculate no. of page fault for following reference string sequence and 3 memory frames. (1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6) **[CO-5, L-A]**

b. Write a program to implement first in first out (FIFO) page replacement algorithm. Calculate number of page fault and page fault rat for following reference string sequence and 3 memory frames.
(1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6) **[CO-5, L-A]**

c. Consider following processes with burst time & arrival time given. Find waiting time for each process & average waiting using SRTF (Shortest Remaining Time First) algorithm.

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

[CO-4, L-A]

CO19R202

SYDA 2025-26 **CO19202/CO19R20**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : CO (Sandwich Pattern)
Course Title : Programming in C++

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary.
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define variable. Give one example. **[CO-1, L-R]**
b. List data types in C++. **[CO-1, L-R]**
c. Define structure. Give one example. **[CO-1, L-R]**
d. Define pointer. Give one example. **[CO-1, L-R]**
e. Define default argument in function. **[CO-2, L-U]**
f. Explain the need of constructor. **[CO-3, L-U]**
g. Explain the significance of destructor. **[CO-3, L-U]**
h. List file stream classes. **[CO-5, L-R]**
i. Write syntax to open and close a file. **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain any two loops statements in C++ with examples. **[CO-1, L-U]**
b. Explain nested structure with one example. **[CO-1, L-U]**
c. Explain class and object with example. **[CO-3, L-U]**
d. Write a C++ program to write contents of one file to another. **[CO-5, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain implicit and explicit type conversion in C++. **[CO-1, L-U]**
b. Explain nested structure with one example. **[CO-2, L-U]**
c. Create a class employee with four members emp-id, emp-name & emp-sal and member functions to read() & display() data () to print details of two employees. **[CO-3, L-A]**
d. Explain parameterized constructor and copy constructor with example. **[CO-3, L-A]**

Q. 4 Attempt any THREE **12 Marks**

a. Explain static member function in C++ with example **[CO-3, L-U]**
b. Explain this pointer in C++ with example. **[CO-3, L-U]**
c. Differentiate between function overloading & function overriding (any three points) **[CO-4, L-U]**
d. Explain exception handling in C++ **[CO-4, L-U]**
e. Explain the concept of polymorphism with its types. **[CO-5, L-U]**

Q. 5 **Attempt any TWO** **12 Marks**

a. Write a C++ program having two functions i) Factorial to find factorial of a number ii) Avg () to find average of 3 numbers. Pass suitable parameters from main (). **[CO-2, L-A]**

b. Write a C++ program to implement single inheritance. **[CO-4, L-A]**

c. Write short note on i) STL vector class ii) Parametric polymorphism. **[CO-5, L-U]**

****End****

EVEN 2025-26

CO19312/CO19R312

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Software Testing**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State the term software testing and list types of software testing. **[CO-1, L-R]**
b. Enlist objectives of software testing. **[CO-1, L-R]**
c. State white box testing and list its types. **[CO-2, L-R]**
d. State the advantages of black box testing. **[CO-2, L-R]**
e. State the need of boundary value analysis. **[CO-2, L-R]**
f. Write the need of drivers. **[CO-3, L-R]**
g. Enlist any two activities involved in test planning. **[CO-4, L-R]**
h. State any four basic principles of writing good test cases. **[CO-4, L-R]**
i. Write any four limitations of manual testing. **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Compare verification & validation (any four points). **[CO-1, L-U]**
b. Describe code complexity testing with example. **[CO-2, L-A]**
c. Describe the types of integration testing with neat diagram. **[CO-3, L-U]**
d. Explain different factors for selecting a testing tools. **[CO-5, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain the techniques for black box testing (any one) with example. **[CO-2, L-A]**
b. Explain performance testing in details and give example. **[CO-3, L-A]**
c. Design test cases for the data filed from admission form of your institution (data filed are Name, SSC %, Mobile no, Address). **[CO-4, L-A]**
d. Describe the need of automated testing tools. **[CO-5, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Define following terms i) Bug ii) Error iii) Fault. **[CO-1, L-R,U]**
b. Differentiate between quality assurance & quality control (valid four points). **[CO-1, L-U,A]**
c. Compare alpha testing & beta testing (valid four points). **[CO-3, L-U,A]**
d. Explain special tests in details (any two). **[CO-3, L-U]**
e. Explain with example requirement traceability matrix. **[CO-4, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain in detail V-model with labeled diagram. **[CO-1, L-U]**

b. Prepare a test plan along with test cases for creating a saving account at bank (test cases should be at least three). **[CO-4, L-A]**

c. Explain importance of automated tools along with features. **[CO-5, L-U]**

****End****

EVEN 2025-26 **CO19311/ CO19R311**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Next Generation Databases**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Differentiate between RDBMS & NoSQL **[CO-1, L-R]**
b. What is BASE property of NoSQL.? **[CO-1, L-R]**
c. List different MangoDB data types with example (Any two) **[CO-2, L-R]**
d. What is the difference between BSON & JSON format. **[CO-2, L-R]**
e. Define sharding? **[CO-3, L-R]**
f. List the components of replica set. **[CO-3, L-R]**
g. Define cloud computing. **[CO-4, L-R]**
h. What is distributed database ? **[CO-5, L-R]**
i. State the applications of distributed database. (Any two) **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain CAP theorem in database ? **[CO-1, L-R]**
b. Describe different MangoDB CRUD operations with example. **[CO-2, L-R,U,A]**
c. Explain types of modelling in MangoDB. **[CO-3, L-U,A]**
d. Explain types of indexes in MangoDB. **[CO-3, L-U,A]**

Q. 3 Attempt any THREE **12 Marks**

a. Enlist the different features of MangoDB. **[CO-2, L-R,U]**
b. Explain pipeline operations in MangoDB. (Any four) **[CO-3, L-A]**
c. How to create (APPED) Collection in MangoDB. **[CO-3, L-A]**
d. Differentiate between Distributed database and Centralized Database system. **[CO-4, L-R]**

Q. 4 Attempt any FOUR **12 Marks**

a. State different benefits of cloud database. **[CO-4, L-R]**
b. How you can access database on cloud through mongo shell? **[CO-4, L-A]**
c. Enlist benefits of cloud database . **[CO-4, L-U]**
d. Explain client server architecture? **[CO-5, L-R]**
e. Describe Heterogeneous DDBMS and Homogeneous DDBMS. **[CO-5, L-R]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain different types of NoSQL with example. **[CO-1, L-U]**

b. Write MangoDB commands for following operation
i) Create Database ii) Drop Database iii) Create collection
iv) Drop collection v) Database Backup vi) Database Restore
[CO-2, L-A]

c. Explain following terms with example (Any three)
i) projection ii) Skip
iii) Limit iv) Sort **[CO-3, L-A]**

****End****

EVEN 2025-26 **CO19313**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Computer Engineering
Course Title : Computer Security

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define the terms : (i) Assets (ii) Vulnerability (iii) Threats (iv) Risks. **[CO-1, L-R]**
b. Define virus. Enlist different phases of virus. **[CO-2, L-R]**
c. Enlist any four consequences when the system is accessed by non-employee. **[CO-1, L-R]**
d. State any four drawbacks of retina scan biometrics. **[CO-1, L-U]**
e. Define hashing. Give its advantages. **[CO-2, L-R]**
f. Differentiate between symmetric and asymmetric cryptography. (any two points) **[CO-2, L-R]**
g. State the needs of firewall. (any four) **[CO-3, L-U]**
h. State the function of application gateways firewall. (any four) **[CO-3, L-R]**
i. Differentiate between firewall and intrusion detection system. (any two points) **[CO-3, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain denial of service attack with neat labelled diagram. **[CO-1, L-U]**
b. i) State what is access control?
ii) Describe following : DAC , MAC, RBAC **[CO-1, L-R]**
c. Enlist types of biometric. Explain any one type in detail. **[CO-1, L-U]**
d. Explain the role of PGP in email security. **[CO-3, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain what are the components of good software and four password selection strategies. **[CO-1, L-A]**
b. Convert given plain text into cipher text using Caesar's cipher with shift of position three. Write down steps in encryption plain text = "Computer Security". **[CO-2, L-A]**
c. Explain in brief. a) IT Act 2000 b) IT Act 2008. **[CO-3, L-R]**
d. Explain the architecture of secure socket layer. **[CO-4, L-R]**

Q. 4 Attempt any FOUR **12 Marks**

a. Convert the given plain text into cipher text using simple columnar technique. Plain text = Welcome to Computer World, number of columns = 6, Encryption key =326154. **[CO-2, L-A]**

b. Describe the host based intrusion detection system with suitable diagram. **[CO-3, L-U]**

c. Describe following terms of intellectual property (i) Copyright (ii) Patent (iii) Trademark **[CO-3, L-U]**

d. Explain how investigation can be done at crime scene. Enlist the rules of evidence. **[CO-3, L-U]**

e. Explain how SQL injection can be done on website with example. How prevention can be done for web security? **[CO-4, L-A]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain steganography technique with suitable diagram. **[CO-2, L-U]**

b. (i) In RSA algorithm, if p = 7, q = 11 and public key is 13 then find the private key.

(ii) In Diffie – Hellman key exchange, prime value q = 17 and primitive root = 5. If A's secret key is 4 and B's secret key is 6, what will be secret key? **[CO-2, L-A]**

c. Write the steps to create active directory in windows server 0S. **[CO-4, L-U]**

***** END*****

EVEN 2025-26

CO19R406/CO19406

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Data Analytics using R**

2:30 Hours/ 60 marks Enrolment No. | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State the need of data mining. **[CO-1, L-R]**
b. Enlist features of R language. **[CO-2, L-R]**
c. State the use of seq () and assign () functions in R. **[CO-2, L-R]**
d. State the use of order function in data frame. **[CO-2, L-R]**
e. State the use of rbind and cbind functions in R with example. **[CO-2, L-R]**
f. Write command to import and export data from & to CSV file. **[CO-3, L-A]**
g. Write a command to create a simple line graph using plot () function. (Assume your own data) **[CO-4, L-A]**
h. Enlist job roles in data science area. **[CO-1, L-R]**
i. State the use of median function in R. **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Describe problem solving steps in data science. **[CO-1, L-U]**
b. Describe following vector functions (i) Sort (ii) Scan with suitable example. **[CO-2, L-A]**
c. Write command to create a dataframe 'book' with data, bid, bname, publication. (i) Add new column price in existing dataframe. **[CO-2, L-A]**
d. Write a command to create pie chart for following data with all parameters:
Book ← C ("comic", 'history", "biography", "fantasy")
Readers ← C (40,55,30,60) **[CO-4, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Describe components of big data. **[CO-1, L-R]**
b. Describe factor data structure with example. **[CO-2, L-U]**
c. Describe melting and casting of dataframe. **[CO-2, L-U]**
d. Describe linear regression with example. **[CO-5, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Create 4 * 3 matrix of even numbers from 1 to 24. Write commands to display number of rows and columns in matrix. **[CO-2, L-A]**
b. Describe following concepts with example (i) if – else (ii) for loop. **[CO-2, L-U]**

c. Write command to create bar chart for following data with all parameters :
Platform ← C ("facebook", "whatsapp", "Instagram", "You Tube")
Users ← C (40,75,50,80) **[CO-4, L-A]**

d. Describe creation of 54 class and object with example. **[CO-6, L-U]**

e. Describe mean and mode functions in R with example. **[CO-5, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain join operations in dataframe with example (Assume suitable data). **[CO-2, L-A]**

b. Create array with dimension 4 * 3 * 2. Write commands to (i) Display sum of all array elements (ii) To find minimum and maximum elements of array. **[CO-2, L-U]**

c. Describe lazy evaluation of function with suitable example. **[CO-3, L-A]**

****End****

EVEN 2025-26 CO19204/CO19R204

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : CO/IF (Sandwich Pattern)
Course Title : Data Structure

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Enlist any two applications of an array. **[CO-1, L-R]**
b. Define NULL pointer and EMPTY list with respect to linked list. **[CO-4, L-R]**
c. Define stack and state the principle of stack. **[CO-2, L-R]**
d. Enlist the types of queue. **[CO-3, L-R]**
e. Define the terms 'Overflow' and 'Underflow with respect to stack. **[CO-2, L-R]**
f. State the operations performed on linked list. **[CO-4, L-R]**
g. Define sorting and enlist its methods. **[CO-5, L-R]**
h. State principle of queue with neat diagram. **[CO-3, L-R]**
i. Define abstract data type (ADT). **[CO-1, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain following terms with respect to graph (i) node (ii) edge (iii) in-degree (iv) out-degree. **[CO-4, L-U]**
b. With suitable diagram explain searching for a value in a singly linked list. **[CO-4, L-A]**
c. Explain binary searching with suitable example. **[CO-5, L-A]**
d. Construct binary search tree for 31,22,25,13,30,41,43,45,10,20,35. **[CO-4, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Describe classification of data structure with example. **[CO-1, L-U]**
b. Sort and arrange given number in ascending order using insertion sort 10,50,20,15,5. **[CO-5, L-A]**
c. Explain operations on queue with neat diagram. **[CO-2, L-A]**
d. Convert following infix to postfix (A+B) * C+ (D-E)/F+G. **[CO-3, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain any three types of binary tree with suitable diagram. **[CO-4, L-U]**
b. Differentiate between linear and non-linear data structure. (any three points) **[CO-1, L-U]**
c. Explain any three types of linked-list with suitable diagram. **[CO-4, L-U]**
d. State the principle of stack with PUSH () and POP () operation with example. **[CO-2, L-A]**

e. Distinguish between linear queue and circular queue. (any three points) **[CO-3, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain in order, preorder, post order traversal of the binary tree. Consider fig.no..5.1 for tree traversal. **[CO-4, L-A]**

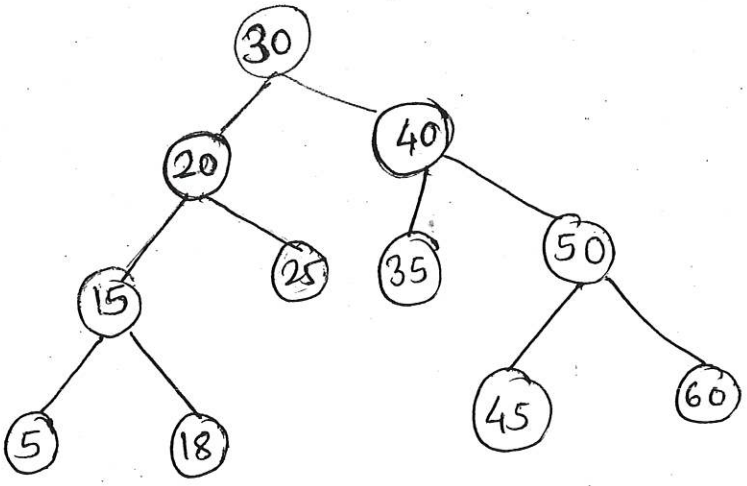


Fig No. 5.1

b. Write an algorithm to insert new node at the beginning, after a given node and at the end of a singly linked list. **[CO-4, L-A]**

c. Write an algorithm and program for bubble sort. **[CO-5, L-A]**

****END****

EVEN 2025-26 **CO23114**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Computer Engineering (Sandwich Pattern)
Course Title : Computer Security

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary.
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define computer security & write need of computer security. **[CO-1, L-R]**
b. Write criteria for good password selection. **[CO-1, L-A]**
c. State the concept of Steganography. Give it's two applications. **[CO-2, L-R]**
d. Define Firewall & State it's characteristics. **[CO-3, L-R]**
e. Define cyber crime & enlist any four cyber crimes. **[CO-4, L-R]**
f. List out the threats to the security. **[CO-1, L-R]**
g. Define Acess control. State the policies used in Acess control. **[CO-1, L-R]**
h. Define cryptography & cryptanalysis. **[CO-2, L-R]**
i. List out cyber forensic tools. **[CO-4, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Describe principles of computer security. **[CO-1, L-U]**
b. Describe DES algorithm, with neat block diagram. **[CO-2, L-U]**
c. Compare between host intrusion detection & network intrusion detection system. **[CO-3, L-A]**
d. Distinguish between symmetric & asymmetric key cryptography. **[CO-2, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain Biometric & describe any one with it's advantage & disadvantages. **[CO-1, L-U]**
b. Explain D-H key exchange algorithm with an example. **[CO-2, L-A]**
c. Write the procedure for investigating crime scene. **[CO-4, L-A]**
d. Explain how SQL injection can be done on website with an example & prevention of it for web security. **[CO-4, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Describe following security attacks:
   i) Denial of service attacks
   ii) Man in the middle attack **[CO-1, L-U]**

b. Decipher a message: " TSACT SGCEB HISRM SELNV JSEEG AVITP" using a simple columnar using 10 columns & 3 rows & retrieve original message. **[CO-2, L-A]**

c. State the process of application hardening. **[CO-4, L-A]**

d. State the significance of hashing in digital signature. **[CO-2, L-A]**

e. Describe secure socket layer protocol. **[CO-4, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Describe following social engineering attacks with it's preventive measures.
   i) Shoulder surfing
   ii) Dumpster Diving. **[CO-1, L-U]**

b. Explain transposition techniques i) Rail Fence ii) Simple columnar. Convert following plaintext "Computer Engineering " in to cipher text by using rail fence. **[CO-2, L-A]**

c. With neat diagram explain working principle of PGP. **[CO-3, L-A]**

****End****

EVEN 2025-26 **CO23105**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Programming in JAVA**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

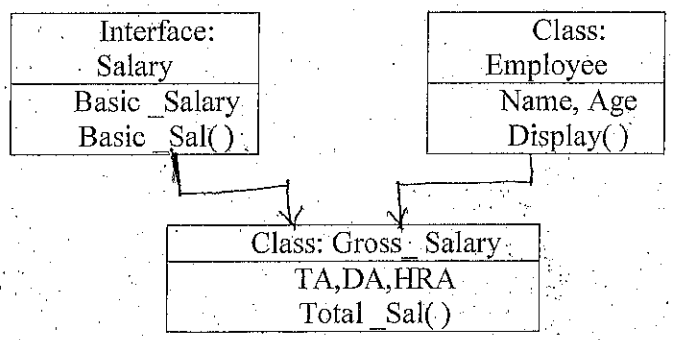
Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. List any four features of JAVA. **[CO-1, L-R]**
b. Compare JAVA with C++ (Any four points) **[CO-1, L-U]**
c. Write use of final keyword in JAVA. **[CO-3, L-U]**
d. Explain any four attributes of <applet> tag. **[CO-6, L-U]**
e. Define constructor. List types of constructer in JAVA. **[CO-2, L-R]**
f. Enlist different types of error in JAVA. **[CO-4, L-R]**
g. List type 4 driver in JDBC. **[CO-5, L-U]**
h. Explain two ways to create thread in JAVA. **[CO-4, L-R]**
i. List any two method of frame class. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain break and continue statement. **[CO-1, L-U]**
b. Implement given inheritance.



[CO-3, L-A]

c. Write a program to copy the content of one file to another using FileInputStream and FileOutputStream class. **[CO-5, L-A]**
d. Write a program to create Vector that stores "Employee" Object (having id, name salary) Perform following operations.
i) Add 5 employees detail to vector
ii) Display all Employee details
iii) Remove an employee by ID
iv) Search for an employee by name. **[CO-2, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Write a program to overload a method area for calculating area of square, rectangle and circle. **[CO-2, L-A]**

b. Explain JDBC Architecture. **[CO-5, L-A]**

c. Write a program to develop an Applet that display "welcome to JAVA Applet programming" **[CO-6, L-A]**

d. Explain life cycle of thread with neat diagram. **[CO-4, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Write a JAVA program to read 10 integer into an array and count how many even number & odd number occurs. **[CO-1, L-A]**

b. Differentiate between classes & Interface . **[CO-3, L-U]**

c. Explain working of try, catch, finally, block with a diagram. **[CO-4, L-U]**

d. Explain purpose of abstract methods and abstract class in java. **[CO-4, L-U]**

e. Explain Byte stream and character stream class in java. **[CO-5, L-R,U]**

Q. 5 Attempt any TWO **12 Marks**

a. Create a user defined package named "Student InFo" that contain class "Student" data members as Roll No, Name & marks. Define methods to Accept and display student details. Write another program to use " Student InFo" package and to display information for 3 students. **[CO-3, L-A]**

b. Explain - i) Thread life cycle
ii) Thread priority. **[CO-4, L-A]**

c. Write a program for applet to accept a Account No and balance in Form of parameter and print message :" Law balance" if balance is less than 500 **[CO-6, L-A]**

****End****

EVEN 2025-26 **CO23104**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Data Structure**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define Data structure. List its need (Any two) **[CO-1, L-R]**
b. Define Abstract Data type. **[CO-1, L-U]**
c. Define Node, null pointer in linked list. **[CO-4, L-U]**
d. Define stack List operations that can be performed on stack. **[CO-2, L-U]**
e. Define overflow and underflow in stack. **[CO-2, L-U]**
f. Define Queue. Write overflow and underflow conditions of Queue. **[CO-3, L-R]**
g. Differentiate between priority Queue and circular Queue (Any two Points) **[CO-3, L-U]**
h. Differentiate between searching and sorting **[CO-5, L-U]**
i. Define the terms i) Graph
ii) Weight **[CO-5, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain in Detail classification Data Structure **[CO-1, L-U]**
b. Compare between singly Linked List and doubly Linked List. (Any four Points) **[CO-4, L-U]**
c. Explain insertion and deletion operations on Queue. **[CO-3, L-U]**
d. Draw Best for following values.
43, 10, 79, 90, 12, 54, 11, 9, 50 **[CO-4, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Describe Block chain . **[CO-4, L-U]**
b. Explain how postfix expression is evaluated using stack . Give proper example. **[CO-2, L-U]**
c. Differentiate between Linear search and Binary search (Any Four Points) **[CO-5, L-U]**
d. Explain Graph terminologies i) In degree ii) Out degree iii) node iv) arcs **[CO-4, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. List and explain operations on Data Structure. **[CO-1, L-U]**

b. Write an algorithm to perform Push operation on stack. **[CO-2, L-A]**

c. List and explain applications of Queue. **[CO-3, L-U]**

d. Explain Bubble sort with proper example. Elaborate each step. **[CO-4, L-A]**

e. Differentiate General Tree and Binary search Tree.(Any three points) **[CO4-, L-A]**

Q. 5 Attempt any TWO **12 Marks**

a. Write and explain algorithm to perform insertion operation on sorted singly Linked List **[CO-4, L-A]**

b. Explain Quick sort and Merge sort with proper example. **[CO-5, L-U]**

c. Explain in detail preorder, Inorder, post order Traversing in Tree. **[CO-4, L-U]**

****End****

EVEN 2025-26 **CO23115**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Software Testing**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State software testing. **[CO-1, L-R]**
b. Give any 2 between of black box testing. **[CO-3, L-U]**
c. Write any 4 Myths of software testing. **[CO-1, L-R]**
d. Write need and benefit of Recovery testing. **[CO-5, L-U]**
e. State precision and Accuracy. **[CO-1, L-R]**
f. State the use of smoke testing. **[CO-5, L-U]**
g. State the impact of Bugs. **[CO-1, L-U]**
h. Write limitations of manual Testing (any two). **[CO-6, L-R]**
i. Write benefits of automation in Testing. (any two). **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Write characterization of good software Tester. **[CO-1, L-U]**
b. Describe the need, use and purpose of Unit testing. **[CO-2, L-U]**
c. Explain positive and Negative testing for example accepting percentage of between 35 to 100 from user. **[CO-3, L-A]**
d. Write 2 test case using white box testing for login & Registration form. **[CO-2, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain Bugs Life cycle. **[CO-4, L-R]**
b. Write need of compatibility testing. Also explain its types with example. **[CO-5, L-R]**
c. Write a good example test care for IRC TC ticket booking website (any 2) **[CO-4, L-A]**
d. Identify and explain factors to be considered while choosing an automation testing tool. **[CO-6, L-]**

Q. 4 Attempt any FOUR **12 Marks**

a. Describe the need of Integration testing by considering any example. **[CO-2, L-A]**

b. Explain the situation where we can use automated test tools and give two benefits of it. **[CO-6, L-A]**

c. Define test schedule for Institute admission portal. **[CO-4, L-A]**

d. Describe use and feature of any automation testing tool. **[CO-6, L-U]**

e. Write any 6 benefits of Gray Box Testing. **[CO-3, L-R]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain Decision coverage & condition coverage with example. **[CO-5, L-U]**

b. Explain User Acceptance Testing in detail. **[CO-5, L-U]**

c. Explain the purpose of regression testing and perform test case to validate unchanged functionalities after modification. **[CO-3, L-A]**

****End****

EVEN 2025-26 **CO23110**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Software Engineering**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State the need of software. **[CO-1, L-R]**
b. State the need of SRS. **[CO-3, L-R]**
c. State the term function point. (FP) **[CO-6, L-R]**
d. State the importance of requirements validation. **[CO-3, L-A]**
e. Write use of structured flow chart. **[CO-4, L-A]**
f. State importance of DevOps . **[CO-5, L-U]**
g. Give importance of software modeling. **[CO-4, L-U]**
h. State the terms i) Product ii) Process **[CO-1, L-R]**
i. Write two benefits of software project management. **[CO-6, L-A]**

Q.2 Attempt any THREE **12 Marks**

a. Explain any 4 myths related to software. **[CO-1, L-U]**
b. Explain water fall model for banking software. **[CO-2, L-A]**
c. State core principles of software engineering practices. **[CO-3, L-U]**
d. Explain data modeling and need of data modeling [data modeling : translating Requirement model into design model.] **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Explain incremental process model in detail. **[CO-2, L-R]**
b. Differentiate between prescriptive and Agile process model. **[CO-5, L-A]**
c. Explain the management spectrum – 4p's. **[CO-6, L-R]**
d. Write short node on JIRA. **[CO-5, L-R]**

Q. 4 Attempt any FOUR **12 Marks**

a. Write selection criteria for software process model. **[CO-2, L-U]**
b. Draw level-1 Data flow diagram for student result application (software) **[CO-4, L-A]**
c. State need and importance of Risk management. **[CO-6, L-U]**
d. Write a short note on elements of analysis model. **[CO-4, L-U]**
e. Write short note on Line of code (LOC). **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain software development life cycle in detail. **[CO-1, L-U]**

b. Explain (SCRUM) process flow with suitable diagram. **[CO-5, L-U]**

c. Explain importance of requirement gathering and analysis also explain any two types of requirements. **[CO-3, L-U]**

****End****

EVEN 2025-26 **CO23107**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Computer Engineering (Sandwich Pattern)
Course Title : Computer Network

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

Instructions:
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. List the categories of computer networks based on connection. **[CO-1, L-R]**
b. Differentiate between classful addressing and classless addressing. (any two points) **[CO-3, L-A]**
c. Give any example of communication where multicast address can be used. **[CO-3, L-A]**
d. Describe peer-to-peer paradigm in short. **[CO-5, L-U]**
e. Describe the use of 'S' in HITPS. Give example. **[CO-5, L-A]**
f. Describe use of cookies in one line. Give example. **[CO-5, L-A]**
g. Describe the need of DNS. (any two points) **[CO-6, L-U]**
h. List the application leyer protocols which are used for remote login. **[CO-6, L-R]**
i. Mr. 'X' sitting in Mumbai wants to send an E-mail to Mr. 'Y' sitting in Banglore. Write the name of protocol which is used to send an email. **[CO-6, L-A]**

Q.2 Attempt any THREE **12 Marks**

a. Differentiate between circuit switching and packet switching. **[CO-3, L-U]**
b. Explain steps to calculate checksum along with example. **[CO-3, L-U]**
c. Differentiate between TCP & UDP. (any four points) **[CO-4, L-U]**
d. Find the subnet mask in each case : **[CO-3, L-A]**
   (i) 1024 subnets in class A
   (ii) 256 subnets in class B
   (iii) 32 subnets in class C
   (iv) 4 subnets in class C

Q. 3 Attempt any THREE **12 Marks**

a. Explain how TCP connection is established. **[CO-4, L-U]**
b. Explain client server paradigm. **[CO-5, L-U]**
c. Explain the use of TLS & SSL. **[CO-5, L-A]**
d. Explain packet filter firewall and proxy firewall. **[CO-6, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Define the terns : (i) Physical address (ii) Logical address (iii) Port address. **[CO-1, L-R]**

b. Write comparison between OSI and TCP/IP protocol suite (any three points) **[CO-1, L-U]**

c. List the names of first three classes of IP address along with its range of addresses. **[CO-2, L-R]**

d. Define the terms : (i) Subnetting (ii) Supernetting (iii) Datagram. **[CO-3, L-R]**

e. Enlist the protocols used at transport layer along with its use in one line (any three). **[CO-4, L-R]**

Q. 5 Attempt any TWO **12 Marks**

a. Draw and explain Ethernet frame format. **[CO-2, L-U]**

b. An organization is granted the block 130.56.0.0/16. The administrator wants to create 1024 subnets.
   (i) Find the subnet mask
   (ii) Find the number of addresses in each subnet
   (iii) Find the first and the last address in the first subnet **[CO-3, L-A]**

c. Write in one line, the use of following protocols. **[CO-4, L-A]**
   (i) ARP (ii) RARP (iii) DHCP (iv) SSH (v) FTP (vi) SMTP.

****END****

EVEN 2025-26

CO23108

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Database Management System**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define DBMS. List its applications (any two). **[CO-1, L-R]**
b. Define Normalization. List its needs (any 2). **[CO-2/3, L-R]**
c. Describe aggregate functions (any two). **[CO-4, L-R]**
d. Define transaction. Give one example of transaction. **[CO-5, L-R]**
e. Compare between serial execution & concurrent execution of transactions. (any two points) **[CO-5, L-U]**
f. How data security is provided? (any two ways) **[CO-6, L-R]**
g. Explain revoke privilege in database. **[CO-7, L-U]**
h. List database recovery techniques. (any two) **[CO-6, L-U]**
i. Define PL/SQL. List its advantages. (any two) **[CO-7, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. List and explain types of attributes. **[CO-2/3, L-U]**
b. Write SQL commands for following statements. (i) Create table student (Name, Roll, Marks) attributes (ii) Insert data of 05 students (iii) Update marks of student having Roll = 01 (iv) Add new column marks in this table. **[CO-4, L-A]**
c. Explain with example outer join. **[CO-4, L-U]**
d. Explain : (i) Types of database failure. (ii) Causes of database failure. **[CO-6, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Draw ER diagram for library management system. **[CO-2/3, L-A]**
b. Explain states of transaction with proper diagram. **[CO-5, L-U]**
c. Write SQL queries for following task. (Assume suitable data) **[CO-6, L-A]** (i) Create user in database (ii) Grant privileges to user (iii) Delete user (iv) Revoke privileges.
d. Explain exception handling in PL/SQL. **[CO-7, L-U]**

Q. 4 Attempt any FOUR **12 Marks**

a. Describe the following terms : (i) Data dictionary (ii) Instance (iii) Schema. **[CO-1, L-U]**
b. Explain in detail insert, update and delete anomalies. **[CO-4, L-U]**
c. Explain starvation of transaction with example. **[CO-5, L-U]**

d. Explain PL/SQL execution environment. **[CO-7, L-U]**
e. Explain view with proper example. **[CO-4, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain overall structure of DBMS with diagram. **[CO-1, L-U]**
b. Explain the terms with example : **[CO-4, L-U]**
   (i) UNIQUE constraint
   (ii) CHECK constraint
   (iii) FOREIGN KEY constraint
c. Explain in detail cursor also give one example. **[CO-7, L-U]**

****End****

EVEN 2025-26 **CO23109**

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **CO/IF (Sandwich Pattern)**
Course Title : **Operating System**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State any two goals of operating system. **[CO-1, L-R]**
b. Compare command line and GUI based operating system (2 points). **[CO-1, L-R]**
c. State the purpose of system call in operating system. **[CO-2, L-R]**
d. Define scheduling. List its types. **[CO-3, L-R]**
e. State the concept of context switch. **[CO-3, L-R]**
f. State the concept of CPU burst and input/output burst. **[CO-4, L-R]**
g. Write any two CPU scheduling objectives. **[CO-4, L-U]**
h. Define logical address space & physical address space. **[CO-5, L-U]**
i. Define file. List types of files. **[CO-6, L-R]**

Q.2 Attempt any THREE **12 Marks**

a. Explain mobile operating system with one example. **[CO-1, L-U]**
b. Consider set of processes given in table 1. Calculate average waiting time using round robin scheduling. Assume time slice 2 msec. **[CO-4, L-A]**

Process	Arrival Time	Burst Time
P1	0	3
P2	1	1
P3	2	5
P4	3	4

c. Compare FCFS with SJF. **[CO-4, L-U]**
d. Give memory partitions of 100k, 500k, 200k, 300k and 600k (in order) how would first fit, best fit and worst fit algorithm place process of 417k? Which algo makes most efficient use of memory? **[CO-5, L-A]**

Q. 3 Attempt any THREE **12 Marks**

a. Compare monolithic and microkernel operating system (4 points). **[CO-2, L-U]**
b. Explain any four data structures used in Banker's Algorithm of deadlock avoidance. **[CO-4, L-U]**
c. Explain the concept of virtual memory in brief. **[CO-5, L-U]**
d. Differentiate between paging & segmentation. **[CO-5, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain any three process control system calls. **[CO-2, L-U]**
b. Write any three services of operating system. **[CO-2, L-U]**
c. Describe interprocess communication model. **[CO-3, L-U]**
d. Draw neat diagram for all multithreading models. **[CO-3, L-U]**
e. State the concept of swapping. **[CO-5, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. State the concept of deadlock & describe necessary conditions for deadlock occurrence. **[CO-4, L-U]**
b. Consider page reference string 7,0,1,2,0,3,0,4,2,3,0,3,2,3 with 3 page frames. Find number of page hit and page fault using NRU algorithm. **[CO-5, L-A]**
c. Explain with necessary assertions and example, which file allocation method is not suffered from external fragmentation. **[CO-6, L-A]**

****End****

EVEN 2025-26

CO23113

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : **Computer Engineering (Sandwich Pattern)**
Course Title : **Fundamentals of AI & ML Algorithms**

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. Define artificial intelligence. **[CO-1, L-R]**
b. List any four applications of AI. **[CO-1, L-R]**
c. Define uninformed and informed search. **[CO-2, L-R]**
d. State the components of an intelligent agent. **[CO-1, L-U]**
e. Define knowledge representation and give an example. **[CO-3, L-R]**
f. Write the main idea of hill climbing search. **[CO-2, L-U]**
g. Define confusion matrix and list two performance metrics. **[CO-6, L-U]**
h. What is probabilistic reasoning? **[CO-3, L-U]**
i. State properties of A* algorithm. **[CO-2, L-U]**

Q.2 Attempt any THREE **12 Marks**

a. Explain structure and types of AI agents with a neat diagram (any two). **[CO-1, L-U]**
b. Explain A* search algorithm and its admissibility. **[CO-2, L-A]**
c. Explain forward and backward chaining with example. **[CO-3, L-U]**
d. Explain different forms of data. **[CO-4, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Define reasoning. Explain any two types of reasoning. **[CO-3, L-U]**
b. Explain the technique of data cleaning. **[CO-4, L-U]**
c. Describe K-means clustering steps and initialization issues. **[CO-5, L-A]**
d. Define overfitting and its methods to reduce it. **[CO-6, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Explain state-space representation for a search problem. **[CO-2, L-U]**
b. Explain first-order logic with example. **[CO-3, L-U]**
c. Define uncertainty. Explain causes of uncertainty. **[CO-3, L-U]**
d. Compare supervised and unsupervised learning. **[CO-5, L-U]**
e. Explain metrics for regression any one. **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. Explain different phases of machine learning life cycle. **[CO-4, L-U]**

b. Explain i) DFS ii) BFS. **[CO-2, L-U]**

c. Explain linear regression with example. **[CO-6, L-A]**

****End****

EVEN 2025-26

CO23502

GOVERNMENT POLYTECHNIC MUMBAI
TERM END EXAMINATION

Programme : Computer Engineering (Sandwich Pattern)
Course Title : Digital Techniques and Microprocessor

2:30 Hours / 60 marks Enrolment No. | | | | | | | | | |

***Instructions*:**
1. Attempt all the questions.
2. Illustrate your answers with neat sketches wherever necessary.
3. Use of Mathematical Tables, Steam Table and Pocket Calculator (non-programmable) is permissible.
4. Marks on Right Hand Side indicate full marks for the question.
5. Assume suitable additional data, if necessary
6. CO=COURSE OUTCOMES, L=LEVELS

Q.1 Attempt any SIX **12 Marks**

a. State the difference between signed and unsigned binary numbers. **[CO-1, L-U]**
b. Perform 2's compliment for $(11001010)_2$ **[CO-1, L-R]**
c. State De Morgan's theorems. **[CO-2, L-R]**
d. State Duality theorem. **[CO-2, L-R]**
e. Draw full adder circuit. **[CO-3, L-U]**
f. Draw the block diagram of a 4:1 MUX. **[CO-3, L-U]**
g. List any four features of 8086. **[CO-4, L-R]**
h. List the limitations of 8-bit Microprocessor. **[CO-4, L-R]**
i. List any Four arithmetic instructions. **[CO-5, L-U]**

Q.2 Attempt any THREE **12 Marks**

a. Draw Architecture of 8086 and explain (BIU) and (EU). **[CO-4, L-U]**
b. Simplify using Boolean Algebra and realize using basic gates:
$F = AB + \bar{A}B + A\bar{B}$ **[CO-2, L-A]**
c. Draw & explain half adder circuit. **[CO-3, L-U]**
d. Draw symbols of following logic gates : i) AND ii) OR iii) NOR iv) XOR **[CO-1, L-U]**

Q. 3 Attempt any THREE **12 Marks**

a. Design all basic logic gates using Universal gates. **[CO-1, L-A]**
b. Simplify using 2-variable K-map:
$F(A, B) = \Sigma m(0, 1, 3)$ **[CO-2, L-A]**
c. Describe addressing modes of 8086. **[CO-5, L-U]**
d. Write an ALP to find largest number in an array. **[CO-6, L-A]**

Q. 4 Attempt any FOUR **12 Marks**

a. Compare: Combinational and sequential circuits (any three points) . **[CO-3, L-U]**

b. Explain functions of following instructions : i) CMP ii) XCHG **[CO-5, L-U]**

c. Write an ALP to find sum of array (assume suitable Data). **[CO-6, L-A]**

d. Write an ALP to multiply two 8-bit numbers (assume Data). **[CO-6, L-A]**

e. Write short note on: Linker & Loader **[CO-6, L-U]**

Q. 5 Attempt any TWO **12 Marks**

a. i) Draw & explain JK- flip flop. **[CO-3, L-U]**

ii) Design a 4-bit shift register. **[CO-3, L-A]**

a. Draw pin configuration of IC 8086 and state the function of following pins : i) $AD_0 - AD_{15}$ ii) HOLD iii) CLK iv) INTR **[CO-4, L-U]**

b. i) Explain conditional & unconditional jump instructions with examples.
ii) State the difference between LOOP and JMP with relevant example. **[CO-5, L-U]**

****End****