1 (Sem–5/FYUGP) COM02MJ/(A)/(B)

2025

COMPUTER SCIENCE

(Major)

Paper : COM0500204(A)

(SET–A)

(Java Programming)

Full Marks : 45

Time : 2 hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed : 1×5=5

   (a) _____ is the intermediate, platform-independent code generated by the Java compiler from Java source code. *(Fill in the blank)*

   (b) _____ is a short-circuit operator. *(Fill in the blank)*

(c) _____ method in Java is a protected method defined in the Object class to perform cleanup operations before it is destroyed by the garbage collector. *(Fill in the blank)*

(d) The StringBuffer class in Java is used to create and manipulate mutable sequences of characters. *(State True **or** False)*

(e) _____ object is used to access query results retrieved from the relational databases. *(Fill in the blank)*

2. Define the following terms : ***(any five)*** 2×5=10

(a) bytecode

(b) PATH variable

(c) Final class

(d) Static method

(e) Abstract class

(f) Wrapper class

(g) Dynamic method dispatch

(h) swing

(i) JDBC

(j) Exception handling

3. Answer ***any four*** of the following questions : 5×4=20

(a) Briefly describe the features of Java programming language.

(b) What are the different types of literals in Java? Give example of each.

(c) Explain Java access specifiers.

(d) Explain the use of super keyword with suitable example.

(e) Write brief description of *any five* String methods.

(f) Differentiate among final, finally and finalize.

(g) Explain Exception handling mechanism in Java.

(h) Write brief description of *any two* layout managers of swing.

4. Answer ***any one*** of following questions : 10×1=10

(a) Describe *any five* key components of JDBC.

(b) Write a program to demonstrate the use of Scanner class and BufferedReader class.

(c) What is interface? What are the key characteristics of interfaces in Java? Give example.

(d) Why Java is considered a strongly typed language? Justify your answer.

Paper : COM0500204(B)

(SET–B)

(Python Programming)

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed : 1×5=5

(a) Python allows variable names of unlimited length.

*(State True **or** False)*

(b) What arithmetic operators cannot be used with strings in Python ?

(a) *

(b) –

(c) +

(d) All of the above

(Choose the correct option)

(c) In Python, _____ is a small, anonymous function.

(Fill in the blank)

(d) Python tuples are immutable.

*(State True **or** False)*

(e) _____ is a low level graph plotting library in python that serves as a visualization utility.

(Fill in the blank)

2. Define the following terms : ***(any five)*** 2×5=10

(a) Code indentation

(b) Python shell

(c) Slicing operator

(d) List

(e) Dictionary

(f) Lamda function

(g) __init__()

(h) Polymorphism

(i) NumPy

(j) pip

3. Answer ***any four*** of the following questions : 5×4=20

(a) Write brief description of *any five* methods of built-in str class.

(b) Write the use of break, continue and pass statement.

(c) Write key characteristics of Python dictionary.

(d) Why lamda functions are used ? Write a lamda function.

(e) Write brief description of exception handling mechanism.

(f) What is log file in python ? Write brief description of
logger.debug( ), logger.info( )
and logger.error( )

(g) Write a python program to demonstrate multilevel inheritance.

(h) Write the steps for Python Database Connectivity.

4. Answer ***any one*** of the following questions : 10×1=10

(a) Write recursive and iterative functions to find factorial of a number.

(b) Write a python program to add and multiply two matrices.

(c) Write a program to define custom exception in Python.

(d) Discuss the tasks that can be performed using OpenCV.

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3 (Sem–5/CBCS) CSC HC 1

2025

COMPUTER SCIENCE

(Honours Core)

Paper : CSC–HC–5016

(Internet Technology)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed : 1×7=7

   (a) The return-type of setter methods of JavaBean class should be void.
   (State true ***or*** *false)*

   (b) _____ is a jsp implicit object.
   (Fill in the blank)

   (c) _jspService( ) method of HttpJspPage class should not be overridden.
   (State true ***or*** *false)*

(d) MVC stands for _____.
(Fill in the blank)

(e) The _____ method of Connection Interface of JDBC is used to create statement. *(Fill in the blank)*

(f) JavaScript handles the HTML events *via* Event Handlers.
*(State true **or** false)*

(g) CSS stands for _____.
(Fill in the blank)

2. Define the following terms : 2×4=8

(a) JAR file

(b) SMTP

(c) DNS

(d) HTTP

3. Answer ***any three*** of the following questions : 5×3=15

(a) What is JDBC ? Give brief description of *any four* popular *interfaces* of JDBC API.

(b) What is ArrayList in Java ? Write a program to create an ArrayList and use *any three* methods of ArrayList.

(c) What is CSS ? What are the applications of CSS ? Briefly explain the syntax of CSS.

(d) Give brief description of *any five* date and time methods used in JavaScript.

(e) Describe the tags used in creating tables in HTML.

4. Answer ***any three*** of the following questions : 10×3=30

(a) Write down the steps to be followed to create a new Bean. Describe each step briefly.

(b) Design an HTML form to input user's name and the product the user would like to buy. Then display "Hello <username>" on a JSP. On the same page ask the quantity the user would like to buy. Then redirect to another JSP which would display "Hello <username>, you have ordered<product> <quantity>".

(c) Explain the differences between Servlet and JSP.

(d) Write a Java program to create a table and insert records in it using JDBC API.

(e) Design an HTML page to input three numbers and write a JavaScript code to print the largest number.

(f) Design the front page of your answer script using HTML and CSS.

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3 (Sem–5/CBCS) CSC HC 2

2025

COMPUTER SCIENCE

(Honours Core)

Paper : CSC–HC–5026

(Theory of Computation)

Full Marks : 60

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed : $1 \times 7 = 7$

   (a) A context-free grammar G is said to be _____ if there exists some $w \in L(G)$ that has at least two distinct derivation trees. *(Fill in the blank)*

   (b) Pumping Lemma is used as a proof for regularity of a language.
   (State true ***or*** *false)*

(c) Regular expression for all strings that contain no run of a's of length greater than two. $(\sum = \{a, b, c\})$ is _____.
(Fill in the blank)

(d) Regular languages is not closed under concatenation. *(State true **or** false)*

(e) Regular expression for the set $\{a^n b^m : (n+m)\}$ is even$\}$ $(\sum\{0,1\})$ is _____. *(Fill in the blank)*

(f) Any language is defined by a unique DFA, but the converse is not true.
*(State true **or** false)*

(g) Each move of a deterministic automaton is uniquely determined by the current configuration. *(State true **or** false)*

2. Define the following terms : 2×4=8

(a) Chomsky normal form

(b) Right linear grammar

(c) Pumping Lemma for regular language

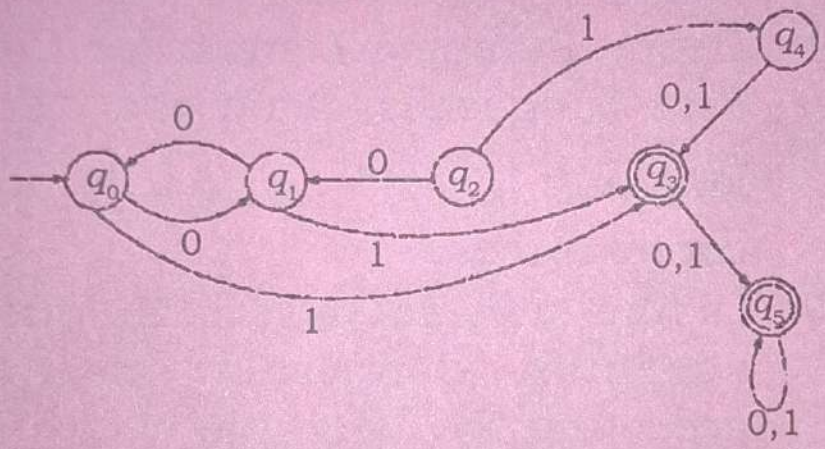
(d) Non-deterministic finite acceptor

3. Answer ***any three*** of the following questions: 5×3=15

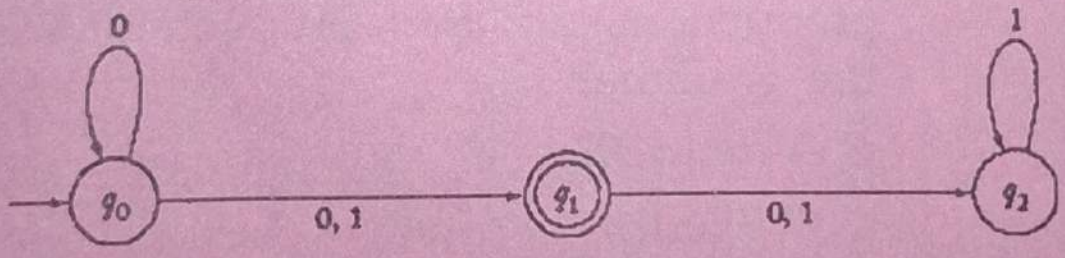
(a) Convert the grammar $S \rightarrow ab \mid aS \mid aaS$ into Greibach normal form.

(b) Prove that regular languages is closed under union and intersection.

(c) Minimize the states in the dfa depicted in the following diagram :



(d) Convert the nfa shown below into an equivalent deterministic machine :



(e) For $\sum = \{a, b\}$, construct dfa that accept all strings with at least one a and exactly two b's.

4. Answer ***any three*** of the following questions: 10×3=30

(a) Prove that context-free languages is closed under union and concatenation. 5+5=10

(b) Show that the following grammar is ambiguous.

$S \to AB \mid aaB,$
$A \to a \mid Aa,$
$B \to b.$

(c) Define Pumping Lemma for Context-Free Languages. Show that the language $L = \{a^{n!} : n \geq 0\}$ is not context-free. 3+7=10

(d) Define non-deterministic pushdown acceptor. Construct an npda for accepting the language

$L = \{ww^R : w \in \{a, b\}^+\}.$ 3+7=10

(e) Remove all unit-productions, all useless productions, and all λ-productions from the grammar

$S \to aA \mid aBB,$
$A \to aaA \mid \lambda,$
$B \to bB \mid bbC,$
$C \to B.$

(f) Show that $A = \{O^p \mid p$ is a prime$\}$ is not a regular language.

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1 (Sem–5/FYUGP) COM04MJ

2025

COMPUTER SCIENCE

(Major)

Paper : COM0500404

(Web Technologies)

Full Marks : 45

Time : 2 hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions as directed : 1×5=5

   (a) Full form of DNS is _____ . *(Fill in the blank)*

   (b) In HTML, _____ tag is used to embed an image. *(Fill in the blank)*

   (c) In HTML, _____ tag defines a hyperlink. *(Fill in the blank)*

(d) The CSS id Selector uses the id attribute of an HTML element to select a specific element.

*(State True **or** False)*

(e) Full form of DOM is _____.

(Fill in the blank)

2. Define the following terms : ***(any five)*** 2×5=10

(a) FTP

(b) GDPR

(c) URL

(d) Web cookie

(e) External CSS

(f) DOM

(g) CSS typography

(h) Event handling

(i) Apache

(j) PDO

3. Answer ***any four*** of the following questions : 5×4=20

(a) Describe the functionalities of web browser.

(b) Explain the functions of DNS.

(c) Describe the tags used to design a table in HTML.

(d) What is CSS selector? What are the *five* categories of CSS selectors?

(e) Write brief description of CSS Box model.

(f) Build a simple JavaScript calculator that can perform basic arithmetic operations.

(g) Write brief description of *any five* string manipulation functions of JavaScript.

(h) Write *any five* differences between HTTP request methods GET and POST.

4. Answer ***any one*** of the following questions : 10

(a) Describe Client-Server Architecture in Web Applications.

(b) Describe with suitable example how HTML elements can be added and modified using JavaScript.

(c) Write a PHP script to connect to a database and fetch data from a table.

(d) Write brief description of *any ten* PHP functions used for string manipulation and mathematical operations.
