



UNIVERSITY EXAMINATIONS

FIRST SEMESTER 2025/2026 ACADEMIC YEAR

**THIRD YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE IN INFORMATION
COMMUNICATION AND TECHNOLOGY**

BICT 312: NETWORK PROGRAMMING

STREAM: R

TIME: 2 HRS

DAY: FRIDAY [14.30 – 16.30 P.M]

DATE: 06/02/2026

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.

INSTRUCTIONS: Section A is compulsory and has **30 marks**.

Attempt any **TWO** questions from Section B. Each question has **20 marks**.

SECTION A – 30 MARKS (ANSWER ALL QUESTIONS)

QUESTION ONE (30 MARKS)

- a) Define the following terms: **(3 Marks)**
- i. Socket
 - ii. Multithreading
 - iii. System call
- b) Outline the steps followed by clients to establish the connection with a server **(4 Marks)**
- c) Describe and illustrate with diagram the three multithreading models **(6 Marks)**
- d) Describe the **TWO** types of (TCP/IP) sockets **(2 Marks)**
- e) Explain the meaning of the following codes involving sockets.
- i. `Int sockid=socket (family, type, protocol)` **(3 Marks)**
 - ii. `States = close (sockid)` **(3 Marks)**
- f) Distinguish between the following process control system calls:
- i. `Fork()` and `malloc()` **(2 Marks)**
 - ii. `free()` and `waitpid()` **(2 Marks)**
- g) Explain **TWO** memory management requirements **(2 Marks)**
- h) The following **two** class methods are defined in the `InetAddress` class: **(3 Marks)**
- (i.) `getByName`
 - (ii.) `getLocalHost`
- Outline the task and return value for each of the methods.

SECTION B – 40 MARKS (ANSWER ANY TWO QUESTIONS)

QUESTION TWO (20 MARKS)

- a) Describe **three** .NET Remoting Components **(6 Marks)**
- b) Distinguish between a switch and a bridge. **(4 Marks)**
- c) Describe the following categories of system calls and outline at least two examples of system calls commands in each case:
- i. Information management **(5 Marks)**
 - ii. Process Control **(5 Marks)**

QUESTION THREE (20 MARKS)

- a) Explain the main difference between UTP and UDP in network programming connections, outlining two specific characteristics in each case. **(6 Marks)**
- b) Outline three ways in which a socket can be uniquely identified: **(3 Marks)**
- c) State two problems associated with threads **(2 Marks)**
- d) With the aid of a diagram, discuss client-server communication using either TCP or UDP sockets. **(9 Marks)**

QUESTION FOUR (20 MARKS)

- a) Distinguish between the two: thread and process. **(2 Marks)**
- b) Give the format of the structure assigned for the shared memory segment. Explain the functions required to access the shared memory. **(6 Marks)**
- c) Write a main method for a Thread application class that created two thread objects and runs them. Assume the Thread application class is called Threaded Server. **(6 Marks)**
- d) Outline four reserved ports and then give the corresponding service for each. **(4 Marks)**
- e) Define the term internet and state the protocol used in the internet. **(2 Marks)**

QUESTION FIVE (20 MARKS)

- a) With an aid of a simple program, explain the fork() system call. **(2 Marks)**
- b) **(6 Marks)**
 - i. Which interface do we need to implement to create a thread object in Java
 - ii. When is implementing the interface in (i.) above viable in creating a thread object in Java?
 - iii. How does the run method compare to the main method in an application class?
- c) Give four constructors of the Thread class and in each case state the arguments passed. **(4 Marks)**
- d) Write a main method of an application class that implements the Runnable interface, creates two thread objects and runs them. Assume the application class is called ThreadedRun. **(8 Marks)**