Strathmore
UNIVERSITY

FACULTY OF INFORMATION TECHNOLOGY
BACHELOR OF SCIENCE IN INFORMATICS AND COMPUTER SCIENCE
END OF SEMESTER EXAMINATION
ICS 2101 – OBJECT-ORIENTED PROGRAMMING II

DATE: 17th July 2019 Time: 2 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

Question One (30 marks)

a) As a UI designer within a given firm, you have been tasked to create a simple dialling interface comprising of 12 dial pads (numbers 0 to 9, and three buttons for calling, deleting, and cancelling). Using knowledge accrued in class, identify the appropriate layout to use in the design for this task, and using Java, write code that will create this simple interface. **(7 marks)**

b) You work for an organization that has been running a legacy Information System implemented in C programming language. However, after acquiring new system that runs in Java, you are required, as the lead developer, to implement a solution to ensure that some of the unique functionalities implemented within the legacy system through some methods are read in the Java side.

i. Suggest and describe the Java technology that would be used for this undertaking. **(2 marks)**
ii. Using a diagrammatic connotation, explain the working of the above technology. **(3 marks)**
iii. Applying your knowledge in Java, and implementing the technology named and described in b) i, write simple Java code with the appropriate methods and calls that would invoke a method from the native-side legacy system. **(4 marks)**

c) With the a servlet's life-cycle in mind, define and explain the functions of the *three* methods that are invoked in any servlet, implemented in the **Servlet Interface.** Ensure you declare, using Java, code snippets for these methods' signatures, each with their required parameters and an appropriate throws statement for exception handling purposes. **(7 marks)**

d) In the event of *multithreading*, you stumble upon 3 threads that must execute at different times due to their varied priority. Explain the *two* thread scheduling techniques the JVM would provide as options for multithreading, then point out the preferred thread scheduler for your specific threads. Also, using Java code snippets, use the right method to assign these different threads with different scheduling constants that would ensure they are executed in the desired order. **(7 marks)**

Question Two (15 marks)

a) Holding the position of a lead developer for a multinational corporation, you have been tasked with the development of an enterprise system that will serve all the global branches. Spearheading this task, you decide to use, among other technologies, *Enterprise Java Beans*. Discuss **three** types of *EJBs* that you will implement, justifying with *two* reasons each why you will use each of them. **(7 marks)**

b) Among the **three** EJB types mentioned as in a), there is one that represents real world objects that interact with the system in different aspects. Identify this EJB type, and using Java, write code that will declare any three of these objects, providing two-parameter constructors that will be used to create objects for the respective objects, and any two methods that will define the behaviours of these objects within a software ecosystem. **(8 marks)**

Question Three (15 marks)

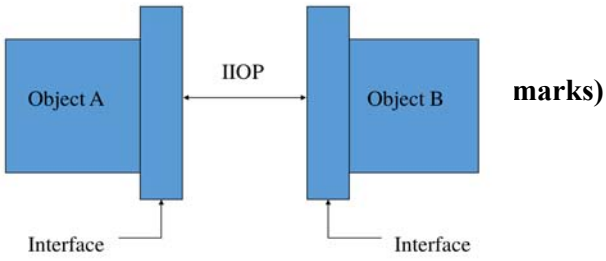
a) Draw a well-labelled diagram to indicate the *five* states of a thread. In the drawing, indicate at least *one* method that can change the state of a previous state to the next state of the thread. **(5 marks)**

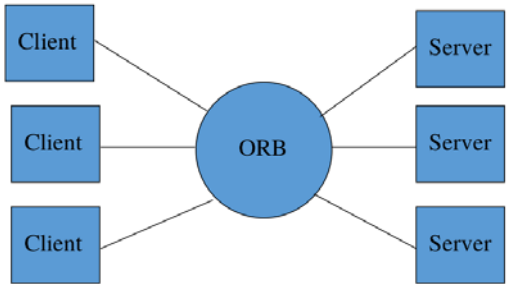
b) **Multithreading** is one of the two ways that multitasking can be achieved. Using Java code snippets, describe *two* ways that a *thread* can be created. **(6 marks)**

c) Describe the function that a **Daemon thread** in Java is assigned to, then using Java code snippet, create a thread using any of the two common ways and assign it to be a Daemon thread using the appropriate method. **(4 marks)**

Question Four (15 marks)

a) The diagrams below indicate the interaction of objects, clients, and objects remotely through an architecture that facilitates such interaction in Java. Name the technology, and in an elaborate explanation, explain how the objects in such an environment would communicate. **(5 marks)**





b) You have been tasked to connect a newly developed Java GUI application to a MySQL database. Using code snippets, describe the *six* steps in ***JDBC*** you will undertake to complete a successful communication between the application and the database. **(10 marks)**

Question Five (15 marks)

a) Distinguish between a *stub* and *skeleton* in **Remote Method Invocation (RMI)** implementation, outlining at least *three* functionalities that each partakes when invoked. **(7 marks)**

b) Exception handling is a requirement that any developer needs to put into consideration whenever there is any code he/she writes bound to throw an exception. Describe the **four** components that could be used to catch and handle an exception, and using Java code snippets, write code that will show all the four components and three exception objects relevant to the chosen scenario caught in practice. **(8 marks)**