



北京邮电大学

# EBU6501 A

Joint Programme Examinations 2017/18

EBU6501 Middleware

Paper A

Time allowed 2 hours

Answer ALL questions

For examiners' use only

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**NOT allowed: Electronic calculators and electronic dictionaries**

## INSTRUCTIONS

1. You must **NOT** take answer books, used or unused, from the examination room.
2. Write only with a black or blue pen **and in English**.
3. Do all rough work in the answer book – **do not tear out any pages**.
4. If you use Supplementary Answer Books, tie them to the end of this book.
5. Write clearly and legibly.
6. **Read the instructions on the inside cover.**

**Examiners**

Dr Gokop Goteng, Dr Gareth Tyson

# Instructions

## Before the start of the examination

- 1) Place your BUPT and QM student cards on the corner of your desk so that your picture is visible.
- 2) Put all bags, coats and other belongings at the back/front of the room. All small items in your pockets, including wallets, mobile phones and other electronic devices must be **placed in your bag in advance. Possession of mobile phones, electronic devices and unauthorised materials is an offence.**
- 3) Please ensure your mobile phone is switched off and that no alarm will sound during the exam. **A mobile phone causing a disruption is also an assessment offence.**
- 4) Do not turn over your question paper or begin writing until told to do.

## During the examination

- 1) You must not communicate with or copy from another student.
- 2) If you require any assistance or wish to leave the examination room for any reason, please raise your hand to attract the attention of the invigilator.
- 3) If you finish the examination early you may leave, but not in the first 30 minutes or the last 10 minutes.
- 4) For 2 hour examinations you may **not** leave temporarily.
- 5) For examinations longer than 2 hours you **may** leave temporarily but not in the first 2 hours or the last 30 minutes.

## At the end of the examination

- 1) You must stop writing immediately – **if you continue writing after being told to stop, that is an assessment offence.**
- 2) Remain in your seat until you are told you may leave.

## Question 1

a) This question is on Message-Oriented Middleware (MOM):

**[15 marks]**

i) The Java Message Service (JMS) is a type of MOM. Describe the TWO types of JMS message consumption.

**(5 marks)**

ii) Describe the THREE types of Publish/Subscribe messages in MOM.

**(6 marks)**

iii) Describe the First-In-First-Out (FIFO) and Journal Queue types of queuing systems in MOM.

**(4 marks)**

[illegible]

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|  | 15<br>marks |

b) State whether each of the following TWO JSP expressions are valid or invalid.

[2 marks]

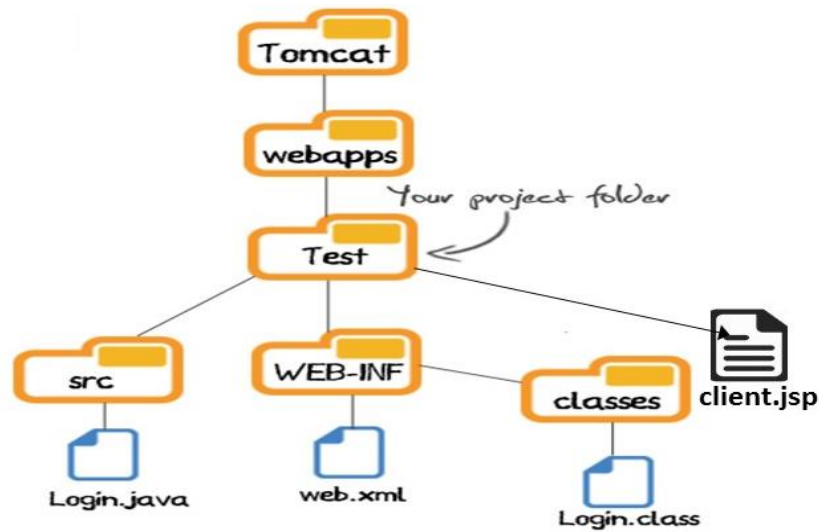
`<%= 50 %>`

`<%= Math.random()+10; %>`

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c) Study the Tomcat directory structure in Figure 1 below and describe the functions of **web.xml** and **client.jsp** and state why they are placed in those specific directories.

**[4 marks]**



### Figure 1: Directory Structure of Tomcat Container

[illegible]

d) Write a simple JSP programme which displays the current date using the Date Java class.

**[4 marks]**

[illegible]

**Question marking:**  $\frac{\quad}{15} + \frac{\quad}{2} + \frac{\quad}{4} + \frac{\quad}{4} = \frac{\quad}{25}$

## Question 2

a) This question is about Threads.

**[15 marks]**

i) With the help of a clearly labelled diagram, explain the FIVE stages and states in the life cycle of a Thread.

**(10 marks)**

ii) The Java code in Figure 2 describes how a typical Java Thread works in a programme. Explain what the code is doing in lines **5, 6, 7, 10** and **12** respectively.

**(5 marks)**

```

1. import java.util.*;
2. public class MySynchronizedYield implements Runnable {
3.     public static void main(String[] args) {
4.         MySynchronizedYield r=new MySynchronizedYield();
5.         Thread t=new Thread(r);
6.         t.start()
7.         synchronized(t) {
8.             try {
9.                 System.out.println("Please wait for me....");
10.                t.wait(100);
11.                System.out.println("Please yield for another....");
12.                t.yield();
13.            } catch (InterruptedException e) { }
14.        }
15.    }
16. }

```

### Figure 2: A Java Code with Thread

[illegible]

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b) Briefly describe what you understand by *ServletConfig* and *ServletContext* Objects in the Java 2 Enterprise Edition (J2EE).

[2 marks]

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- c) **Visibility** and **Race Conditions** are two problems that may occur when storage of data happens in different memory areas of the computer memory model as Java threads attempt to make changes to the data. Using your knowledge of the Java memory model and computer memory model, describe TWO solutions you may use in your multi-threaded Java programme to prevent the problems of **Visibility** and **Race Conditions**.

[4 marks]

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- d) Define **Interrupt** and describe THREE ways to terminate a **Thread**.

[4 marks]

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**Question marking:**  $\frac{\quad}{15} + \frac{\quad}{2} + \frac{\quad}{4} + \frac{\quad}{4} = \frac{\quad}{25}$

- ### Question 3

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[illegible]

- b) There are component parts known as the Bundles in the Open Services Gateway Initiative (OSGi) architecture. Briefly describe the *Services*, *Services Registry*, *Modules*, *Java Virtual Machine* (JVM) and *Execution Environment* which are part of the OSGi which is part of the Java 2 Enterprise Edition (J2EE) Software Development Kit (SDK).

**[10 marks]**

[illegible]

[illegible]

c) Describe the functions of *EJB Client* and *EJB Server* in Enterprise JavaBeans (EJB) architecture.

**[5 marks]**

[illegible]

**Question marking:**  $\frac{1}{10} + \frac{1}{10} + \frac{1}{5} = \frac{1}{2}$

### Question 4

- a) List the **THREE** layers of security implementation in a middleware and describe with *prevention methods* the *Injection Flaws* and *Cross-Site Scripting* security vulnerabilities in middleware and web applications.

**[12 marks]**

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- b) This question is on JavaScript regular expressions:

**[8 marks]**

- i) The JavaScript **RegExp** object defines regular expressions in JavaScript programmes and has TWO methods namely **exec()** and **test()**. Explain the functions of these TWO methods.

**(4 marks)**

- ii) Figure 4 is a JavaScript programme that uses regular expressions. Describe what lines **1** and **2** are doing and the outputs/results that will be printed in lines **3** and **4**.

**(4 marks)**

1. `var pattern1 = /java/i;`
2. `var pattern2 = /java/g;`
3. `pattern1.test("JavaScript");`
4. `pattern2.test("JavaScript");`

### Figure 4: Java Script Regular Expressions

[illegible]

c) Describe the **TWO** constraints in **REST** (Representational State Transfer) protocol which makes it too rigid to use REST as a protocol in some Internet of Things (IoT) applications.

[5 marks]

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Question marking:  $\frac{12}{12} + \frac{8}{8} + \frac{5}{5} = \frac{25}{25}$



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