



北京邮电大学

EBU5304 A

For examiners' use only

1	
2	
3	
Total	

Joint Programme Examinations 2016/17

EBU5304 Software Engineering

Paper A

Time allowed 2 hours

Answer ALL questions

Complete the information below about yourself very carefully.

QM student number

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BUPT student number

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Class number

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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 Ling Ma, Dr Gokop Goteng, Dr Matthew Huntbach, Dr Karen Shoop

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) Answer the following questions about *Software* and *Software Processes*:

[9 marks]

i) What are the most important differences between *generic software* and *custom software*?

(4 marks)

ii) Explain *traceability* in software development.

(2 marks)

iii) A new company finance system is going to be developed to replace the existing system. Suggest the most appropriate software process that might be used. Give your reasons.

(3 marks)

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	9 marks

b) Answer the following questions about the *Agile Process*:

[7 marks]

i) What is a *sprint* in Scrum?

(2 marks)

ii) One of the Agile principles is “*Customer collaboration over contract negotiation*”. Explain this statement.

(2 marks)

iii) A system has to be approved by an external regulator. Discuss the potential problems of using Agile process to develop this system.

(3 marks)

[illegible]

c) Answer the following questions:

[6 marks]

i) “*Safety-critical systems and interactive systems have different priorities for non-functional requirements.*” Explain this statement with examples.

(2 marks)

ii) What is the purpose of *Analysis*?

(2 marks)

iii) What is an *Integration Build Plan*?

(2 marks)

	Do not write in this column
	6 marks

- d) In a small company, an employee's monthly earning is determined by the base salary, commission rate and sales amount. The current base salary is £800. Figure 1 shows the commission rate based on the sales amount. An employee's monthly earning is calculated as:

$$\text{sales amount} \times \text{commission rate} + \text{base salary}$$

Sales amount (integers)	Commission rate
Less than £1000	0.2
Between £1000 and £5000 (exclusive)	0.3
£5000 or more	0.4

Figure 1 Commission rate

You need to test the `calEarning` method which is used to calculate the monthly earning. This method takes the sales amount as input, and outputs the monthly earning. Complete the following questions:

[11 marks]

- i) Design *Test Cases* using *Partition Testing*.

(7 marks)

- ii) The `calEarning` method is tested using an automated test program. Based on your test cases design in i), complete the test program in Figure 2.

```
import junit.framework.TestCase;

public class TestCalEarning extends TestCase{

    public void testCalEarning(){
        Employee e = new Employee(800); //base salary as input
        //Write your code here

    }

}
```

Figure 2 Test program

(4 marks)

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[illegible]

Question marking: $\frac{-}{9} + \frac{-}{7} + \frac{-}{6} + \frac{-}{11} = \frac{-}{33}$

Question 2

- a) A new software start-up company wants to ensure high quality of their software products to have competitive advantage in the market. To achieve this goal, they created a special department that is responsible for creating and establishing processes and standards that will lead to producing high quality products. This department also checks all deliveries of software products to ensure they meet the standards and goals of the company before they are sent out to end users. Answer the following questions:

[11 marks]

- i) Describe the software engineering activity the new department is trying to perform and suggest ONE problem you think they could encounter.

(4 marks)

- ii) Describe TWO reasons to consider a software product as *High Quality Software*.

(4 marks)

- iii) Give THREE points that justify a software product is *Good Enough* to be used.

(3 marks)

[illegible]

[illegible]

b) These questions are on *Risks* in software engineering:

[8 marks]

i) Describe the FOUR stages of the *Risk Management Process* in software engineering.

(4 marks)

ii) Describe TWO types of risks that are both product and project risks in software engineering.

(4 marks)

[illegible]

- c) Describe *Free Software* and state THREE reasons why software engineers may offer, for free, software – including source code that they laboured over to develop.

[5 marks]

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		5 marks

- d) Discuss why software projects are different from other projects, for example building construction projects.

[3 marks]

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		3 marks

e) What is *Test-Driven Development (TDD)*? Describe the *TDD Cycle*.

[6 marks]

[illegible]

Question marking: $\frac{-}{11} + \frac{-}{8} + \frac{-}{5} + \frac{-}{3} + \frac{-}{6} = \frac{-}{33}$

Question 3

- a) An important principle of good software development is to design and implement code in a way that enables it to be *re-used*. This is summarised in the *Open-Closed Principle* (OCP) which states that code should be “open for extension and closed for modification”. Explain in more detail what this means and why it is important. List the main techniques that can be used in an object-oriented programming language like Java to meet the OCP.

[12 marks]

[illegible]

- b) Explain what is meant by *interface types* in Java, and how using them contributes to reducing dependency in line with the *Dependency Inversion Principle* (DIP).

[7 marks]

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	7 marks

- c) Explain the general principle of a *factory method*, and how it is related to, but differs from, direct use of a constructor.

[6 marks]

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	<div>6</div> <div>marks</div>

- d) Explain the concept of structuring objects by the use of *wrappers*. Explain how the use of this technique can help meet the principles of good design of code. Compare the use of wrappers with the use of inheritance for structuring code.

[9 marks]

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Question marking: $\frac{\quad}{12} + \frac{\quad}{7} + \frac{\quad}{6} + \frac{\quad}{9} = \frac{\quad}{34}$

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