



**RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES, MIHINTALE**

B.Sc. Four Year Degree in Applied Sciences

Fourth Year Semester I Examination – Oct/Nov 2015

COM 4201 – INTRODUCTION TO MOBILE COMPUTING

Time allowed: TWO (02) hours

INSTRUCTIONS TO CANDIDATES

- This paper consists of four (04) questions on 3 pages including this page.
- Answer **ALL** questions.
- All questions carry equal marks. Marks allocated for each section of the question is indicated in brackets.
- This examination accounts for 60% of the module assessment.
- This is a **closed book** examination.

NB: It is an offence to be in possession of unauthorized material during the examination.

- Mobile phones or any other communication devices are not permitted.
- Assume reasonable values for any data not given in or with the examination paper. Clearly state such assumptions made on the script.
- In case of any doubt as to the interpretation of the wording of a question, make suitable assumptions and clearly state them on the script.
- This paper should be answered only in English.

1. Mobile Networks [25 marks]

Cellular networks divide the area into cells and uses multiple low power transmitters to cover the entire geographical area. They employ frequency reuse for effective spectrum utilization.

- (a) Explain what is meant by the frequency reuse. [4 marks]
- (b) Briefly explain the following two (2) channel allocation strategies used in cellular networks.
 - i. Dynamic channel allocation
 - ii. Channel borrowing [2x3 marks]
- (c) Briefly explain how cell sectoring increases the capacity of a cellular networks. [4 marks]

802.11 protocol specification supports both centralized and distributed medium access control (MAC).

- (d) Briefly explain the operation of distributed MAC (Distributed coordination function) of 802.11 protocol. [6 marks]
- (e) Enhanced distributed channel access (EDCA) of IEEE 801.11e MAC supports service differentiation. Explain how the service differentiation can be utilized for mobile computing applications using a suitable example application. [5 marks]

2. Mobility Management [25 marks]

Location management and handoff management are the two main tasks of a location management scheme of a mobile computing system.

- (a) List the four (4) sub tasks of handoff management. [2 marks]
- (b) List three (3) major factors that should be considered in one of the four sub tasks. [3 marks]
- (c) Briefly explain the location management operation of a typical cellular network. Your explanation should include all the major entities involved and the role of them. Consider using a diagram to support your explanation. [8 marks]
- (d) Briefly explain the location registration procedure of Mobile IPv4. Your explanation should include all the major entities of Mobile IPv4 and the functions performed by each entity in the location registration process. Consider using a diagram to support your explanation. [6 marks]
- (e) Explain the return routability procedure of IPv6 protocol and explain how it secures binding updates from the mobile node. Consider using a diagram to support your explanation. [6 marks]

3. Context-Aware Computing & Mobile Middleware [25 marks]

- (a) In the paper "The Computer for the 21st Century", Mark Weiser states "The most profound technologies are those that disappear".
- i. Explain the meaning of the above statement. [2 marks]
 - ii. Discuss the applicability of this statement for today's context. Use a suitable example in your explanation. [3 marks]
- (b) Briefly explain the following two (2) concepts discussed in the research paper titled "Mobile Cloud Computing: A Comparison of Application Models".
- i. Augmented execution [3 marks]
 - ii. Elastic partitioned/modularized applications [3 marks]
- (c) List one (1) advantage and one disadvantage (1) of each of the following context representation and processing techniques.
- Formal logic based modelling [2 marks]
 - Object based modelling [2 marks]
- (d) List four (4) contextual services provided by middleware. [4 marks]
- (e) Briefly explain three (3) reasons for mobile agent systems not getting popular. [6 marks]

4. Mobile Application Development [25 marks]

- (a) Compare and contrast the SMS/USSD based mobile applications and smartphone applications considering the reach and the user-friendliness of the applications. [4 marks]
- (b) Mobile applications can be broadly categorized as SMS/USSD based applications, native mobile applications and mobile web applications. For each of the following scenarios, explain what type of application will be more suitable and reasons for your selection.
- i. A mobile application which will allow the Sri Lankan farmers to check the price of the vegetables before they take their harvest to the market. [3 marks]
 - ii. A mobile application for the Sri Lankan public to check the train schedule. [3 marks]
 - iii. A mobile application for e-learning. [3 marks]
 - iv. A mobile application to monitor the driving standards of drivers and alert them real-time about the driving quality of the driver. [3 marks]
- (c) Briefly explain the life-cycle of an Android activity. [4 marks]
- (d) Briefly explain the five (5) levels of the importance hierarchy in Android. [5 marks]

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