

## CIT 413: MOBILE DEVICES, TECHNOLOGIES AND PROGRAMMING

Instructions

Time: 3 Hours

Answer QUESTION ONE and any other TWO questions.

### QUESTION ONE (30 MKS)

- a) Describe the following concepts as used in mobile computing
  - i) Ubiquitous access (2 mks)
  - ii) Wireless Application Protocol (WAP) (3 mks)
- b) The mobile web browser reference architecture comprises of eight major subsystems plus the dependencies between them. Discuss any **FOUR** of these subsystems. (4 mks)
- c) The research that followed from the mid-1970's through the early 1990's created a conceptual framework and algorithmic base that has proven to be of enduring value in all work involving two or more computers connected by a network — whether mobile or static, wired or wireless, sparse or pervasive. This body of knowledge spans many areas that are foundational to pervasive computing and is now well codified. Discuss the following pervasive computing foundational areas
  - i) Remote communication (2 mks)
  - ii) Fault tolerance (2 mks)
  - iii) Security (2 mks)
- d) Businesses that need a mobile app have three available options: *Native apps*, *Mobile web apps* and *Hybrid apps*. Discuss the features of each of these apps. (6 mks)
- e) Wireless Application Environment comprises of SIX elements. Briefly discuss any **FOUR** of these elements. (4 mks)
- f) A mobile operating system (OS) is software that allows smartphones, tablet PCs (personal computers) and other devices to run applications and programs. A mobile OS typically starts up when a device powers on, presenting a screen with icons or tiles that present information and provide application access. Identify any **FIVE** mobile operating systems in the market currently. (5 mks)

### QUESTION TWO (20 MKS)

With the rapid advances and development in the field of mobile and telecommunication sector, the evolution of generation bands has proved to be one of the greatest technologies ever seen. Discuss the following cellular generations

- i) First generation (1G) (3 mks)
- ii) Second generation (2G) (3 mks)
- iii) Third generation (3G) (4 mks)
- iv) Fourth generation (4G) (5 mks)
- v) Fifth generation (5G) (5 mks)

### QUESTION THREE (20 MKS)

Wireless communication networks have some inherent characteristic that boost their usability. Discuss the following features as used in this respect.

- i) User Mobility (5 mks)
- ii) Rapid Installation (5 mks)
- iii) Flexibility (5 mks)
- iv) Scalability (5 mks)

#### **QUESTION FOUR (20 MKS)**

- a) Mobile IP, as proposed by the Internet Engineering Task Force (IETF) in RFC 2002 and subsequent RFCs, provides an efficient, scalable mechanism for node mobility within the Internet. Nodes may move and change their point of attachment to the Internet without changing their IP address. Describe the following mobile IP new architectural entities.
  - i) Mobile Node (4 mks)
  - ii) Home Agent (4 mks)
  - iii) Foreign Agent (4 mks)
- b) Discuss the following terminologies is used in the mobile IP documents
  - i) Care-of Address (4 mks)
  - ii) Tunnel (4 mks)
  - iii) Mobility Security Association (4 mks)

#### **QUESTION FIVE (20 MKS)**

Quality of Service (QoS) in cellular networks is defined as the capability of the cellular service providers to provide a satisfactory service which includes voice quality, signal strength, low call blocking and dropping probability, high data rates for multimedia and data applications. Discuss the following as used in this perspective.

- i) Throughput (4 mks)
- ii) Delay (4 mks)
- iii) Packet Loss Rate (4 mks)
- iv) Packet Error Rate (4 mks)
- v) Reliability (4 mks)