



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS**  
**DEPARTMENT OF INFORMATION SYSTEMS AND TECHNOLOGY**  
**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF COMPUTER**  
**SECURITY & FORENSIC**  
**3<sup>rd</sup> YEAR 2<sup>nd</sup> SEMESTER 2024/2025 ACADEMIC YEAR**  
**MAIN CAMPUS**

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**COURSE CODE: ICB 1308**

**COURSE TITLE: WIRELESS NETWORKS AND MOBILE COMPUTING**

**EXAM VENUE: LAB 9 TREAM: BSCCOMPUTER SECURITY & FORENSIC**

**DATE: 24/4/2024 EXAM SESSION: 15.00-17.00**

**TIME: 2 HOURS**

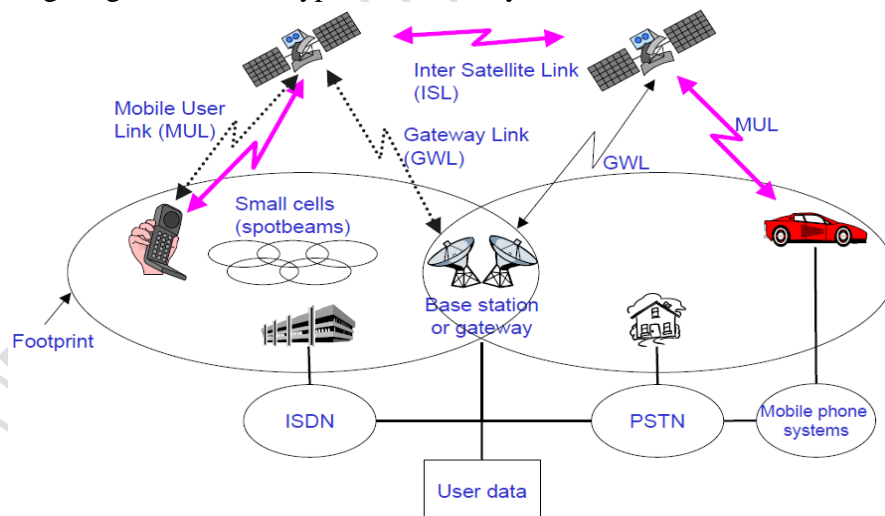
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**INSTRUCTIONS:**

- 1. Answer Question 1 (Compulsory) and ANY other two questions.**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

### QUESTION ONE (30 MKS)

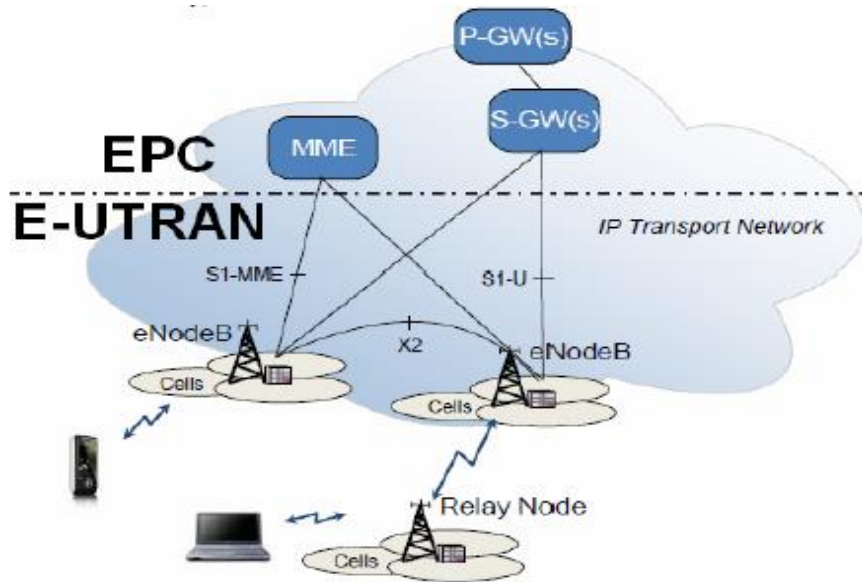
- a) Discuss the following cellular networks Quality of Service (QoS) metrics:
- i) Throughput (3 mks)
  - ii) Delay (3 mks)
  - iii) Packet Error Rate (2 mks)
  - iv) Reliability (2 mks)
- b) Mobile IP is intended to solve node mobility issues over the IP layer. It is just as suitable for mobility across homogeneous media as it is for mobility across heterogeneous media. Mobile IP facilitates node movement from one Ethernet segment to another as well as handling node movement from an Ethernet segment to a wireless local area network (LAN). Discuss the following concepts as used in Mobile IP:
- i) Mobile Node (4 mks)
  - ii) Home Agent (4 mks)
- c) Discuss *location areas* and *reporting cells* as used in location management schemes. (4 mks)
- d) The following diagram shows a typical satellite system.



- i) Explain *Footprint* and *Inclination* as used in these satellite systems. (4 mks)
- ii) Describe some of the application domains for satellite communication. (4 mks)

### QUESTION TWO (20 MKS)

The following figure illustrates the basic LTE-Advanced E-UTRAN architecture. Study it keenly and use it to answer the questions that follow.



Describe the functions of the following elements of this 4G architecture:

- i) E-UTRAN (5 mks)
- ii) S-GW (5 mks)
- iii) P-GW (5 mks)
- iv) MME (5 mks)

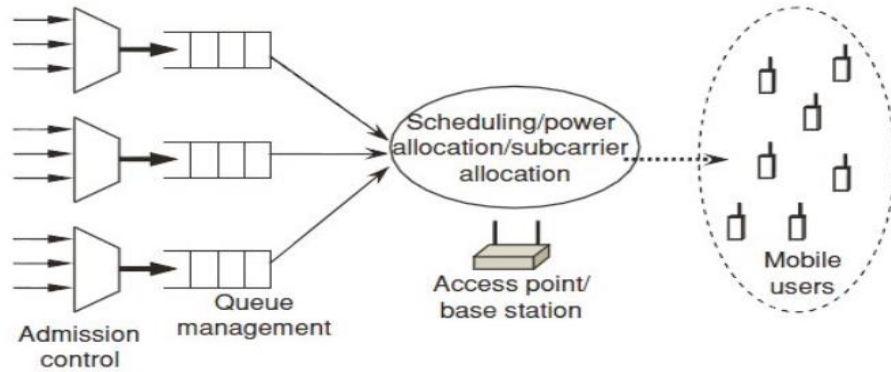
**QUESTION THREE (20 MKS)**

There are numerous methods for performing handoff, at least as many as the kinds of state information that have been defined for MSs, as well as the kinds of network entities that maintain the state information. The decision-making process of handoff may be centralized or decentralized (i.e., the handoff decision may be made at the MS or network). Describe the following handoff decision strategies:

- i) Network-Controlled Handoff (7 mks)
- ii) Mobile-Assisted Handoff (6 mks)
- iii) Mobile-Controlled Handoff (7 mks)

**QUESTION FOUR (20 MKS)**

Some of the important objectives of resource management are the minimization of the interference level and handoffs as well as the adaptation to varying traffic and interference scenarios. The figure below gives an illustration of some of the radio resource management tasks.

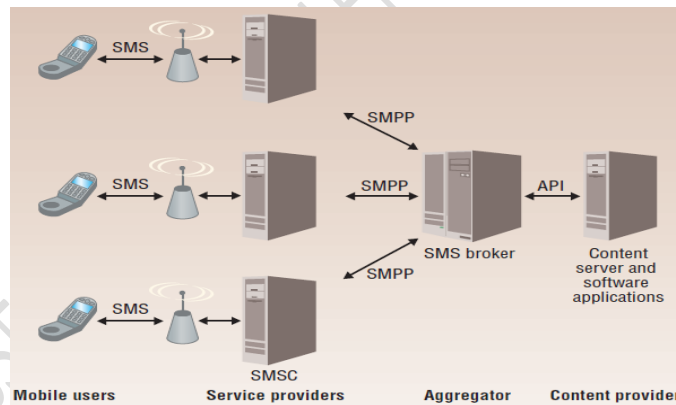


With reference to the 5G networks, describe the following radio resource management activities:

- i) Power control (6 mks)
- ii) Admission control (6 mks)
- iii) Frequency management and channel assignment (8 mks)

**QUESTION FIVE (20 MKS)**

The diagram below shows a typical SMS system architecture. Study it carefully and use it to answer the questions that follow.



- a) Give a brief history of the above SMS technology. (5 mks)
- b) Using relevant examples, discuss the following SMS applications:
  - i) Consumer applications (5mks)
  - ii) Corporate applications (5mks)
  - iii) Cell operator applications (5mks)