



ELIZADE UNIVERSITY, ILARA-MOKIN, ONDO STATE  
FACULTY OF ENGINEERING  
DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

SEMESTER I EXAMINATION, 2016/2017 ACADEMIC SESSION

COURSE TITLE: SATELLITE COMMUNICATION

COURSE CODE: ECT 411

EXAMINATION DATE: 27<sup>TH</sup> MARCH, 2017

COURSE LECTURER: DR. O. M. Longe

A rectangular box containing a handwritten signature in black ink.

HOD's SIGNATURE

TIME ALLOWED: 2 HRS

**INSTRUCTIONS**

1. ATTEMPT ANY FIVE QUESTIONS ONLY.
2. ALL QUESTIONS CARRY EQUAL MARK.
3. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM.
4. YOU ARE NOT ALLOWED TO BORROW CALCULATORS AND ANY OTHER WRITING MATERIALS DURING THE EXAMINATION.

QUESTION ONE

- a. What is a satellite? Name the first satellite?

[2 mks]

- b. With the aid of block diagram explain the general structure of a satellite communication system. [6 mks]
- c. Explain any two major satellite subsystem. [4 mks]

QUESTION TWO

- a. Mention the four basic types of antenna in satellite communication. [4 mks]
- b. Determine the free space loss for a Ku band downlink between Telstar 5 at 98°W longitude and Los Angeles with an orbit radius of 42,150 km if the frequency is 12 GHz and the angle of elevation is 45°. (Given that earth radius = 6378 km). [6 mks]
- c. Define Effective Isotropic Radiated Power (EIRP). [2 mks]

QUESTION THREE

- a. Define the following terms:
  - i. Pointing loss [1.5 mks]
  - ii. Antenna directivity [1.5 mks]
- b. With the aid of appropriate diagram explain frequency reuse in satellite communication among three satellites in Toronto, Portugal and Lagos. [6 mks]
- c. A transmitter feeds a power of 155W into an antenna that has a gain of 38 dBi. Calculate the EIRP in watts and decibels relative to 1W. [3 mks]

QUESTION FOUR

- a. With the aid of diagrams differentiate between Frequency Division Multiple Access (FDMA) and Time Division Multiple Access (TDMA) in satellite communication. [10 mks]
- b. Mention two features of Code Division Multiple Access (CDMA). [2 mks]

QUESTION FIVE

- a. With the aid of diagram explain multibeam satellites. [6 mks]
- b. List any three functioning Nigerian satellites and their launching dates. [6 mks]

QUESTION SIX

- a. Draw a block diagram to illustrate satellite communication channel. [10 mks]
- b. Give two advantages of CDMA. [2 mks]

QUESTION SEVEN

- a. Determine the relative effective area of an antenna of having a physical area of 15.4 km<sup>2</sup>. (Given that efficiency parameter of a dish antenna is 0.55). [2 mks]
- b. Draw a table for satellite frequency spectrum. [5 mks]
- c. Mention the two types of launch vehicles. [2 mks]
- d. Explain any ONE mentioned in (c) above. [3 mks]