



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIFTH YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONICS ENGINEERING

EEE 545: SATELLITE COMMUNICATION

DATE: 4/8/2017

TIME: 2 HOURS

INSTRUCTIONS:

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Define the term inclination hence enlist the three region where frequency allocation is done for satellite (2 marks)
- b) Describe briefly the role of station keeping and geostationary satellite. (3 marks)
- c) Explain the importance of altitude control in satellite orbital. (2 marks)
- d)
 - i) Considering an earth station at the equator, with the antenna pointing either west or east along the horizontal evaluate the limiting angle hence outline various factors that the limits of visibility depends. (3 marks)
 - ii Differentiate between geostationary and non- geostationary. (2 marks)
 - iii. Explain the role of earth station keeping in satellite communication (2 marks)
- e) Describe how spin stabilization is achieved using cylindrical satellite (3 marks)
- f) Discuss briefly the limitations of FDMA satellite access (2 marks)
- g) Differentiate between KU-band and the C-band receive only systems. (2 marks)
- h) Satellite downlink at 14 GHz operates with a transmit power of 8 W and an antenna gain of 50 dB. Calculate the EIRP in dBW. (2 marks)
- i)
 - (i) Compare Master antenna TV with Community antenna TV system (2 marks)
 - (ii) Classify the two areas of satellite communications which are gaining major thrust from leading satellite industries and organizations in recent years. (1 mark)
 - (iii) Highlight various services provided by satellite mobile (2 marks)
 - (iv) Outline the factors that contributing to noise in an earth station receiving channel. (2 marks)

QUESTION TWO (20MARKS)

- a) Express the three Kepler's laws of planetary motion and list the various orbital parameters. (9 marks)
- b) Explain the effect of sun transit outage to satellite (5 marks)
- c) Describe how look angle are used in tracking satellite (6 marks)

QUESTION THREE (20MARKS)

- a) Explain the term satellite attitude and describe two forms of attitude Control (12 marks)
- b) Describe how satellite uplink and downlink for the transmitted and received power is analyzed and accounted for during designing process (8 marks)

QUESTION FOUR (20MARKS)

- a) Explain the technique of TDMA. How TDMA network is advantageous over FDMA network? (10 marks)
- b) Explain the principle behind spectrum spreading and despreading and how this is used to minimize interference in a CDMA system. (10 marks)

QUESTION FIVE (20MARKS)

- a) Discuss some general configurations of an Earth Station. (10 marks)
- b) With an aid of block diagram explain the indoor unit for DBS home receiver (6 marks)
- c) Describe the operation of VSAT networks and enlist any of its two application (4 marks)