NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

FACULTY OF INDUSTRIAL TECHNOLOGY

BACHELOR OF ENGINEERING (HONS) DEGREE

Final examination May 2013 TEE 5221 **COMMUNICATION SYSTEMS**

Duration of Examination 3 Hours

Instructions to Candidates:

1. Answer any **five** questions only.
2. Each question carries equal marks.
3. Show all your steps clearly in any calculation.
4. Start the answers for each question on a fresh page.

Question 1

((a) Describe the operation of an eight phase shift keying (8-PSK). Draw the block diagram of the transmitter; show the truth table, phasor diagram and constellation diagram of the system.

(14 marks)

(b) Show at least three topologies used in LAN .For each give the main advantage.

(6 marks)

Question 2

For an optical fiber with core and cladding refractive index of 1.55 and 1.45 respectively.

Calculate (I) the dielectric constant of the core and the cladding.

(ii) The speed of light in the core and cladding.

(iii) the critical angle of the ray moving from core to cladding.

(iv) The numerical aperture for the fiber.

(v) The acceptance angles for the fiber. (20 marks)

Question 3

(a) State six advantages of optical fibre over copper cables. (6 marks)

(b) State the cause of losses in optical fibre.. (6 marks)

(c) Define and give the expression of unitercepted loss. Give three factors that affect UI loss.

(8 marks)

Question 4

(a) Describe the operation of avalanche photo diode and PIN diode when used as optical receivers. State the advantage and disadvantage of each device when used. (14 marks)

(b) Explain the term Responsivity ,construct a graph to show responsivity. (6 marks)

Question 5

(a) Describe the principle ANIK-D communication satellite as used in satellite multi access arrangements. (10 marks)

(b) With the help of a diagram explain the TDMA ,CEPT primary multiplex frame. (10 marks)

Question 6

(a) Describe frequency hopping. (4 marks)

(b) Define frequency –time matrix in frequency hopping. (2 marks)

(c) Describe digital noninterpolated interfaces. (2 marks)

(d) Describe the operation of CDMA System as applied in multiple accessing. (12 marks)

Question 7

(a) Show the arrangement of a composite signal used in a TV raster ,Label all the parts and levels of the video signal. (12 marks)

(b) Draw a block diagram of the circuit to derive at least six related frequencies used in the composite video signals. (8 marks)

Question 8

(a) An optical communication link is to be built using fiber rated at 500 MHz –km. A 0.25 mW laser diode is used .The fiber has 0.2 dB/km and is available in five kilometre lengths .It can be spliced with 0.2 dB per splice. There would be 5 dB loss in the connectors through out the system .The receiver has a sensitivity of –30 dBm.

(I) Make a link budget for a 50-km fiber link. (14 marks)

(ii) Calculate the system margin in dB. (6 marks)

END