NATIONAL OPEN UNIVERSITY OF NIGERIA,
PLOT 91, CADASTRAL ZONE, UNIVERSITY VILLAGE, JABI – ABUJA
FACULTY OF SCIENCES

JULY 2017 EXAMINATION

COURSE CODE: CIT 755
COURSE CREDIT: 3
COURSE TITLE: WIRELESS COMMUNICATION I
TIME ALLOWED: 3 Hours
INSTRUCTION: Answer question 1 and any other four (4) questions

QUESTIONS

1a. Assuming the maximum dimension of an antenna is 1m and its operating frequency is 900 MHz, determine the far field distance for this antenna. (8 marks)

1b.A major pre-requisite for effectively completing the course: Wireless Communication I, is that you explain how to carry out the propagation of a modulated signal in a radio system to newly registered learners in your Study Centre. Write down the details of your explanation to these learners. (8 marks)

1c. Typically, digital systems offer a number of benefits. State any four (4) of these benefits. (4 marks)

1d. Give a single sentence description of a duplex communication system. (2 marks)

[Total =22 marks]

2a. Within the context of mobile radio channels, briefly mention and describe the three (3) mutually multiplicative propagation phenomena. (6 marks)

2b. Distinguish between the Frequency Division Multiple Access and Code Division Multiple Access using the following as the parameters of comparison:

i. Diversity
ii. Modulation) 2 marks each
iii. Multiple-Access Interference

[Total =12 marks]

3a. Generally multi-path in radio channels produce small-scale fading effects. State any two of such effects. (4 marks)

3b. Determine the modulation index of an FM signal having a carrier swing of 100 kHz if the modulating signal has a frequency of 8 kHz? (6 marks)

3c. Write down two (2) common types of frequency modulation in wireless communication (2 marks)

[Total =12 marks]

4a. State the three (3) main mechanisms responsible for electromagnetic wave propagation. (3 marks)

4b. Write short notes on the following notions:

i. Scattering
ii. Microcell) 3 marks each
iii. Code Division Multiple Access

[Total =12 marks]

5a. Determine the system capacity of a cellular system which has 1001 radio channels available for handling traffic, cell area of 6 km2 and the area of the entire system as 2100 km2. (8 marks)

5b. Assuming you have just been recruited as a Network Administrator in a national Engineering firm using wired technology. Based on your proficiency in Wireless Communication, you are expected to encourage this firm to adopt the wireless technology rather than the existing wired technology. State four (4) good reasons which you would give in order to convince the firm to switch to the wireless technology. (4 marks)

[Total =12 marks]

6a. If a cellular system has a total bandwidth of 30 MHz and uses two 25 kHz simplex channels to provide full duplex voice and control channels. If that system uses a nine-cell reuse pattern and 1 MHz of the total bandwidth allocated for control channels. Calculate:

6ai. The total number of available channels; (2 marks)

6a ii. The total number of control channels (2 marks)

6b. Give a concise description of the following universal notions in wireless communication:

i. Wireless fidelity
ii. Wireless Application Protocol
iii. Wireless energy transfer) 2 marks each
iv. Universal Mobile Telecommunications System

[Total =12 marks]