NATIONAL OPEN UNIVERSITY OF NIGERIA

UNIVERSITY VILLAGE, JABI FCT ABUJA

FACULTY OF SCIENCE

JANUARY/FEBRUARY 2018 EXAMINATION

COURSE CODE: CIT754
COURSE TITLE: DIGITAL COMMUNICATIONS [3 units]

INSTRUCTIONS: Answer any five questions
TIME: 3 Hrs

1(a). Explain the concept of multiplexing [6 mark]

1(b). Mention and describe briefly four different types of multiplexing [8 mark]

2(a) (i) What causes ‘fading’ in a radio channel and how does it affect digital transmissions? [4 marks]

(ii) Explain the difference between 'flat' fading and 'frequency-selective' fading and state what is meant by the ‘coherence bandwidth’ of a channel. [4 marks]

2(b) Compared to analogue techniques, what do you consider to be the three main advantages of digital voice transmission in wired and wireless telephony? - 2 marks each [6 marks]

3(a) Explain the difference between ‘waveform coding’ and ‘parametric coding’ for speech in telephony. [6 marks]

3(b) What features of speech and its perception are exploited by the G711 64 kb/s standard coder for wired telephony to achieve acceptable speech quality at the required bit-rate.? [8 marks]

4 (a) What is the purpose of the ‘physical layer’ in a digital communication system? [6 mark]

4(b). Describe and compare the following modulation techniques:

(i). Pulse Amplitude Modulation (PAM) (4 marks)

(ii). Phase Shift Keying (PSK) (4 mark)

5(a) Speech is digitised at 64 kb/s. How could this bit-stream be efficiently transmitted over a channel of 48 kHz bandwidth centred on 100 kHz? [6 marks]

5(b) According to the Shannon-Hartley Law, what signal-to-noise ratio would be required to ensure that arbitrarily low bit-error rates are achievable for this transmission? [8 marks]

6(a). Distinguish between baud rate and bit rate. (6 marks)

6(b) The 8-point constellation implies an 8-PSK transmission with points located 450 apart. Since 23=8, each signal unit transmitted conveys 3 bits. The baud rate is therefore given by: baud rate = (bit rate) /3 =4800/3 =1600 baud. (8 marks)

7.(a). Explain and state the advantages of broad spectrum signals (8 marks)

7(b). A constellation diagram has 8 equally spaced points on a circle. If the bit rate is 4800 bps, determine the baud rate. (6 marks)