Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2017/2018

COURSE NAME	:	NETWORK TECHNOLOGY
COURSE CODE	:	BNF 32603
PROGRAMME CODE	:	BNF
EXAMINATION DATE	:	JUNE / JULY 2018
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTION	:	ANSWER **ALL** QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

Q1 (a) Describe **THREE (3)** detail reasons for the statement below.

"Digital communication is the preferred method of transmission by the telecommunication companies"

(6 marks)

(b) A wireless link is known to have a loss of 20 dB. The input signal power is measured as 0.5 W and the output noise level is measured as 4.5 μW.

(i) Using this information, calculate the output signal-to-noise ratio in dB.

(ii) Given the link transmit the digital signal and utilizes 20 kHz of bandwidth. Calculate the capacity of the wireless link

(6 marks)

(c) A user subscribed to a mobile broadband service with channel capacity of 20 Mbps, the channel bandwidth allocated to the user is 3 MHz.

(i) Assuming white thermal noise, solve the required signal-to-noise ratio in order to achieve this capacity.

(ii) Channel capacity is the maximum theoretical limit. However, as a practical matter, better error performance will be achieved at a lower data rate. Assume data rate of 3/5 the maximum theoretical limit is chosen. Determine the number signal levels are needed to achieve this data rate.

(8 marks)

Q2 (a) State and differentiate between **TWO (2)** types of error in digital transmission

(4 marks)

(b) Crucial data are stored in 1.4 Mbyte floppy diskettes that weigh 30g each. Suppose that an airliner carries 5300 kg of these floppies at a speed of 980 km/h over a distance of 5000 km. Calculate the data transmission rate of this system (in bits per second).

(4 marks)

(c) A digital wireless network transmitted at 25 Mbps. However, there occurs an impulse noise of 1 μs.

(i) Determine number of error bits in this transmission.

(ii) Calculate number of error bits when the network data rate is increased to 50 Mbps

(iii) Propose an error detection method for this type of error.

(6 marks)

(d) Two communicating devices are using a single-bit even parity check for error detection.

(i) This data transmission has two start bit of '11' and four stop bits of '1010'. If the transmitted data is 10010101, generate the complete data frame.

(3 marks)

(ii) The received data frame with start and stop bits as in question **Q2(d)(i)** is given by 111101011101010. Determine whether the receiver will able to detect the error. Justify your answer.

(3 marks)

Q3 (a) State the definition of circuit switching and packet switching.

(2 marks)

(b) Describe **TWO(2)** advantages and **TWO(2)** disadvantages of circuit switching.

(4 marks)

(c) In a single Space Division Switch (SDS), only 25% of the crosspoints are being used when all connections are utilized. Multistage switch can be implemented to improve the crosspoints usage. Assume 10 inputs and 10 outputs SDS:

(i) Design a single SDS and a 3-stage SDS with input and output divided into 2 groups.

(8 marks)

(ii) Compare the number of crosspoints between single SDS and 3-stage SDS in percentage.

(2 marks)

(d) Non-blocking switched network is suitable for data transfer. Justify this statement.

(4 marks)

Q4 (a) TDM and FDM are the most fundamental and widely used multiplexing methods used in transmission.

(i) Define TDM and FDM.

(2 marks)

(ii) Describe the main different between TDM and FDM.

(4 marks)

(iii) Using 3-dimensional bar graph. Illustrate TDM and FDM.

(2 marks)