IMPERIAL COLLEGE LONDON

[E3.03, ISE3.03]

DEPARTMENT of ELECTRICAL and ELECTRONIC ENGINEERING
EXAMINATIONS 2005

EEE/ISE PART III/IV: M.Eng., B.Eng. and ACGI

COMMUNICATION SYSTEMS

There are FOUR questions (Q1 to Q4)

Answer question ONE and TWO other questions.

Question 1 has 20 multiple choice questions, numbered 1 to 20, all carrying equal marks.

Questions 2, 3 and 4 have 6 multiple choice questions each, numbered 1 to 6, all carrying equal marks.

There is only one correct answer per question.

Distribution of marks

Question-1: 40 marks
Question-2: 30 marks
Question-3: 30 marks
Question-4: 30 marks

The following are provided:

- *A table of Fourier Transforms*
- *A "Gaussian Tail Function" graph*

Examiner: Dr A. Manikas

Question-Q1

– This question has 20 multiple choice questions numbered 1 to 20, all carrying equal marks.
– Circle the answers you think are correct <u>on the paper itself</u>.
– There is only one correct answer per question.

representative examples:

11) The first TDMA multiplexing level of a 30-channel PCM Telephone system uses

A) an AMI line code
B) a polar RZ line code
C) a Manchester line code
D) an HDB3 line code
E) none of the above.

This indicates that (D) is the answer you think is correct

12) The CCITT standards 32kbits/second Differential PCM are

A) for speech signals with bandwidth 3.2 kHz.
B) for audio signals with bandwidth 7 kHz
C) specifying a sampling frequency 16 ksamples/second
D) specifying an 8 levels quantizer
E) none of the above

This indicates that (A) is the answer you think is correct

Question-Q2

— This question has 6 multiple choice questions numbered 1 to 6, all carrying equal marks.
— Circle the answers you think are correct <u>on the paper itself</u>.
— There is only one correct answer per question.

representative example:

1) A digital communication system having an energy utilisation efficiency (EUE) equal to 30, operates in the presence of additive white Gaussian noise of double-sided power spectral density $\text{PSD}_n(f)=0.5 \times 10^{-6}$ W/Hz. If the channel capacity C is 16 kbits/s and the channel bandwidth B is 4 kHz, then the data bit rate r_b is

A) 1.5 kbits/sec
B) 2 kbits/sec
C) 3.5 kbits/sec
D) 4 kbits/sec
E) none of the above.

This indicates that (B) is the answer you think is correct

Question-Q3

— This question has 6 multiple choice questions numbered 1 to 6, all carrying equal marks.
— Circle the answers you think are correct <u>on the paper itself</u>.
— There is only one correct answer per question.

2) A digital communication system having an energy utilisation efficiency (EUE) equal to 30, operates in the presence of additive white Gaussian noise of double-sided power spectral density $\text{PSD}_n(f)=0.5 \times 10^{-6}$ W/Hz. If the channel capacity C is 16 kbits/s and the channel bandwidth B is 4 kHz, then the data bit rate r_b is

A) 1.5 kbits/sec
B) 2 kbits/sec
C) 3.5 kbits/sec
D) 4 kbits/sec
E) none of the above.

This indicates that (D) should be ignored and (B) is the answer you think is correct

Question-Q4

— This question has 6 multiple choice questions numbered 1 to 6, all carrying equal marks.
— Circle the answers you think are correct <u>on the paper itself</u>.
— There is only one correct answer per question.

3) A digital communication system having an energy utilisation efficiency (EUE) equal to 30, operates in the presence of additive white Gaussian noise of double-sided power spectral density $\text{PSD}_n(f)=0.5 \times 10^{-6}$ W/Hz. If the channel capacity C is 16 kbits/s and the channel bandwidth B is 4 kHz, then the data bit rate r_b is

A) 1.5 kbits/sec
B) 2 kbits/sec
C) 3.5 kbits/sec
D) 4 kbits/sec
E) none of the above.

In this case the correct answer (B) will be ignored.
The wrong answer (D) will be taken into account.