



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

DIPLOMA IN TECHNOLOGY
COMPUTER SCIENCE ENGINEERING

EES 3413: TELECOMMUNICATION PRINCIPLES

END OF SEMESTER EXAMINATIONS

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer booklet*
- *A non-programmable scientific calculator*

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

This paper consists of **FOUR** printed pages

Question 1 (Compulsory)

a) Distinguish between the following communication systems and state an example of each:

- i) Point to point
- ii) Broadcasting (4 marks)

b) (i) State and explain any **TWO** applications of a communication system
(ii) State any **TWO** functions of each of the following communication bodies

- (I) Communication Commission of Kenya (CCK)
- (II) International Telecommunication Union (ITU)

(iii) Explain any **TWO** reasons why the optical fibre is gaining popularity as a transmission Media (10 marks)

c) Draw a block diagram of a communication system and explain its operation (7 marks)

d) A telecommunication system consists of **THREE** items connected as shown in fig 1

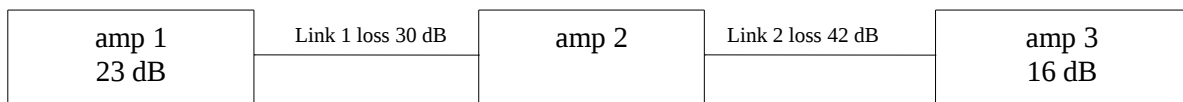


Fig 1

Determine:

- i) Gain of amplifier 2 in dB if the power at its input is 0.316W and that at its output is 12.6W.
- ii) The output power (in watts) from amplifier 1
- iii) Overall gain or loss of the system (6 marks)

e) State the frequency ranges of the following frequency bands and state an application of each

- i) Ultra high frequency (UHF)
- ii) High frequency (HF) (2 marks)

Question 2

a) (i) State any **TWO** advantages of using decibels dB in telecommunication

(ii) Derive the expression for voltage gain in decibels when the two resistances at the Input and output are not matched

(iii) For the communication system block diagram shown in fig 2, calculate the output power

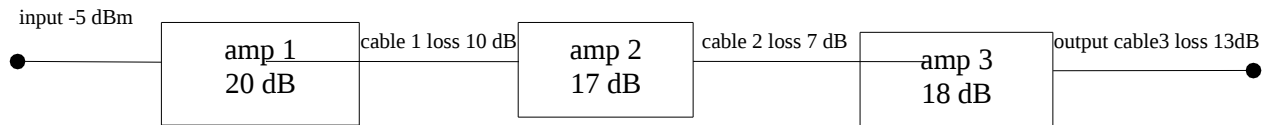


Fig 2

(10 marks)

b) (i) define the following terms as applied to the microphones

- I) Cardioid
- II) Packing

(ii) With the aid of a well labeled diagram, explain the operation of the carbon microphone

(iii) Suggest giving a reason, the most suitable microphone for each of the following applications

- I) Sound broadcasting
- II) Telephony

(10 marks)

Question 3

a) State the frequency range of each of the following

- i) Human speech
- ii) Music
- iii) Video

(3 marks)

b) i) State any **TWO** differences between a moving coil microphone and moving coil loud speaker

ii) With the aid of a labeled diagram, describe the operation of a moving coil loud speaker

iii) Explain the function of the baffle board used in the loud speaker

iv) Distinguish between half duplex and full duplex and give an example of each (15 marks)

c) Determine the turns ratio of a transformer required to match a 50Ω microphone to a line of 600Ω (2 marks)

Question 4

a) (i) Explain the following terms

- (a) Dead zone
- (b) Drop outs

(ii) State any **TWO** effects of drop outs on video reproduction

(iii) Explain why AC biasing is used in audio recording

(6 marks)

b) (i) Explain the **TWO** techniques used to increase the Band width in video recording on Magnetic tapes

- (ii) State any **TWO** advantages of solid state cameras over their tube counter parts
(4 marks)
- c) (i) State any **TWO** advantages of the use of compact disc (CDs) in recording audio Information as compared to magnetic tapes
- (ii) With the aid of a labeled diagram, describe the operation of an optical reflective system Used in CD players
(10 marks)

Question 5

- a) (i) State any **TWO** reasons for the use of modulation in communication systems
- (ii) Derive the expression for amplitude modulated wave given the carrier wave is

$$v_c(t) = V_c \sin w_c t$$

$$v_m(t) = V_m \sin w_m t$$
the modulating signal
- (iii) Sketch the frequency spectrum for carrier which is amplitude modulated by a complex signal
Consisting of three frequencies f_1, f_2 and f_3 of amplitude V_1, V_2 and V_3 assuming $V_1 > V_2 > V_3$
- (iv) Determine the expression for the Band width
(8 marks)
- b) (i) An amplitude modulated (AM) radio transmitter gives an output of 50kw when modulated to a Depth of 80%, determine.
- I) The power of the un modulated carrier
II) The power in the sidebands
- (ii) Sketch the AM wave when the modulation depth is 50%
(6 marks)
- c) (i) State any **TWO** advantages of FM over AM
- (ii) Explain why guard bands are used in communication channels
- (iii) An FM signal has a centre frequency of 103MHz and highest frequency of 103.045MHz when Modulated by a signal frequency of 15KHz. The rated system deviation is 75 KHz.
- (a) The frequency deviation
(b) Modulation index
(6 marks)