



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2015/2016**

COURSE NAME : BROADCASTING TECHNOLOGY
COURSE CODE : BNF 40803
PROGRAMME : BNF
EXAMINATION DATE : JUNE / JULY 2016
DURATION : 2 HOURS AND 30 MINUTES
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

- Q1**
- (a) Define Shannon's Law from the perspective in communication capacity. (2 marks)
 - (b) Convert 50 Watt to:
 - (i) dB
 - (ii) dBm(2 marks)
 - (c) Define the frequency range of analog radio broadcasting and analog television broadcasting. (2 marks)
 - (d) Describe in detail the function of modulator and demodulator for AM radio broadcasting. (4 marks)
 - (e) Given are the modulating signal and the carrier frequency in **Figure Q1(e)**. Illustrate the modulated signal of:
 - (i) AM signal
 - (ii) FM signal(4 marks)
 - (f) Describe **THREE (3)** advantages and **ONE (1)** disadvantage of AM radio broadcasting (4 marks)
 - (g) Describe **TWO (2)** disadvantages of analog radio broadcasting over digital radio broadcasting. (2 marks)
- Q2**
- (a) Illustrate the complete block diagram of a superheterodyne FM-radio receiver. (6 marks)
 - (b) Differentiate between the function of amplitude limiter and frequency discriminator in the superheterodyne FM-radio receiver. (4 marks)
 - (c) Differentiate between the analog radio broadcasting and digital radio/audio broadcasting (DAB). (2 marks)
 - (d) Illustrate the hybrid waveform spectrum of IBOC DAB. (2 marks)
 - (e) Describe **TWO (2)** benefit of using DAB. (2 marks)

- (f) A channel has a bandwidth of 400 kHz which spans from 400 to 800 kHz. Analyze the carrier frequency and the bit rate if the modulated data are using ASK with $d = 1$.
(2 marks)
- (g) Find the bandwidth for a signal transmitting at 24 Mbps for QPSK. The value of $d = 1$.
(2 marks)
- Q3**
- (a) Differentiate between existing analog terrestrial television and digital terrestrial television.
(2 marks)
- (b) Identify **FOUR (4)** benefits of digital terrestrial television.
(4 marks)
- (c) Compute the bit rate for a 3000-baud 16-QAM signal.
(2 marks)
- (d) Differentiate between amplitude shift keying and frequency shift keying in digital broadcasting.
(4 marks)
- (e) A signal carries 4 bits per signal element. If 1000 signal elements are sent per second, compute the bit rate.
(2 marks)
- (f) Differentiate between Orthogonal Frequency Division Multiplexing (OFDM) and Coded Orthogonal Frequency Division Multiplexing (COFDM).
(4 marks)
- (g) List **TWO (2)** advantages of OFDM over FDM.
(2 marks)
- Q4**
- (a) Describe **TWO (2)** advantages of Direct Broadcast Satellite (DBS).
(4 marks)
- (b) Define the uplink and downlink frequency range of the DBS.
(2 marks)
- (c) List **THREE (3)** modulation techniques used in DBS.
(3 marks)
- (d) Describe **FOUR (4)** advantages of Forward error Correction (FEC) in DBS.
(4 marks)

- (e) Compute the EIRP of the ground station if:
- (i) High power amplifier output, $P_o = 100\text{W}$
 - (ii) Waveguide loss = 2.5 dB
 - (iii) Cessagrain antenna gain = 35 dBi
- (3 marks)
- (f) Illustrate the block diagram of a satellite transponder.
- (4 marks)

Q5 (a) Define the function of an antenna. (2 marks)

(b) From **Figure Q5(b)**, analyze the characteristics of the radiation pattern of a Yagi Uda antenna.

- (iv) Type of radiation pattern
 - (v) Gain
 - (vi) Half-power beamwidth
 - (vii) Front to back lobe ratio
 - (viii) Front to side lobe ratio
- (8 marks)

(c) Calculate the Noise Figure of an amplifier if the input signal to noise ratio is 30 dBm and the output signal to noise ratio is 40 dBm. (2 marks)

(d) Analyze the noise factor, F and noise figure, NF of the cascaded amplifier as shown in **Figure Q5(d)**.

- (i) F_{ABC} and NF_{ABC}
- (ii) F_{ACB} and NF_{ACB}
- (iii) From the results above, choose and analyze the best set of cascaded amplifier for a communication system. (8 marks)

- END OF QUESTION -

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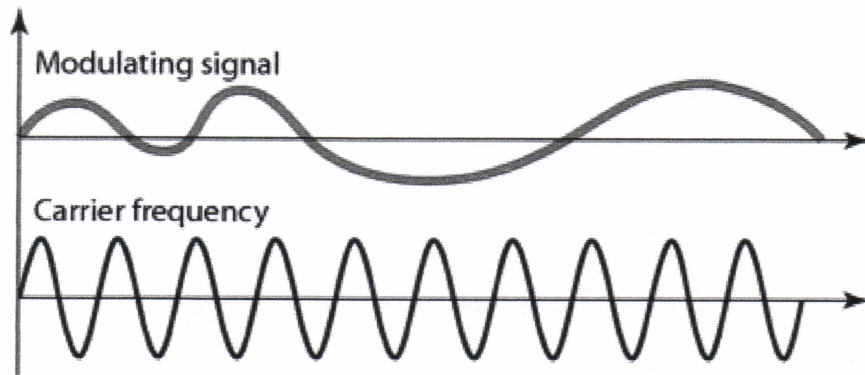


Figure Q1(e)

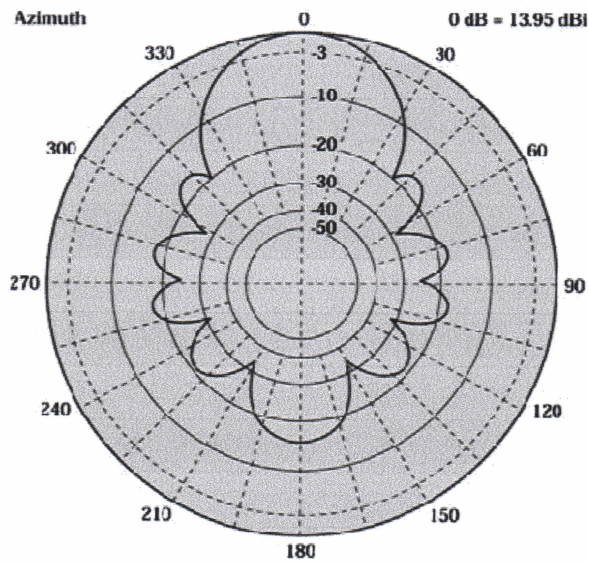


Figure Q5(b)

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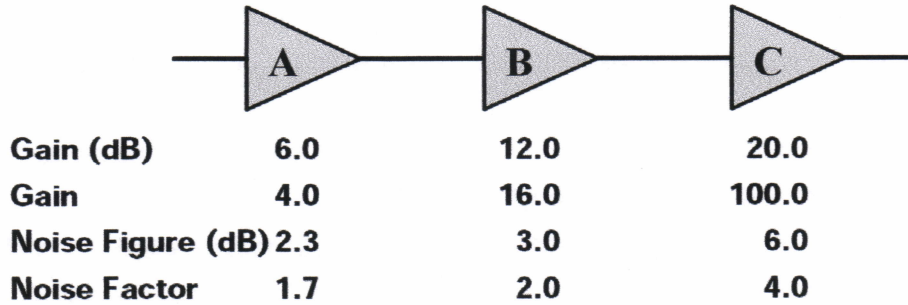


Figure Q5(d)