UNIVERSITY OF JOHANNESBURG

PROGRAM	:	NATIONAL DIPLOMA *ENGINEERING: ELECTRICAL*
SUBJECT	:	**ELECTRONIC COMMUNICATION 2**
CODE	:	**AEC2221**
DATE	:	MAY EXAMINATION 2010 05 JUNE 2015
DURATION	:	(SESSION 1) 08:30 - 11:30
WEIGHT	:	40: 60
TOTAL MARKS	:	100

ASSESSOR	:	MR EM LOOTS
MODERATOR	:	MR PJJ VAN ZYL
NUMBER OF PAGES	:	4 PAGES

2059

INSTRUCTIONS : NON-PROGRAMMABLE CALCULATORS PERMITTED (ONLY ONE PER STUDENT).

INSTRUCTIONS TO STUDENTS

1. ATTEMPT ALL QUESTIONS.
2. ALL SUB-SECTIONS AND WORKING MUST BE SHOWN.
3. MARKS WILL BE DEDUCTED FOR UNTIDY WORK.
4. ONLY DRAWINGS MAY BE IN PENCIL.
5. AN ANSWER WITH NO UNITS IS TAKEN TO BE INCORRECT.
6. ALL ANSWERS IN POLAR FORM UNLESS SPECIFIED OTHERWISE.
7. NEAT ANSWER LAYOUT IS VERY IMPORTANT.
8. QUESTIONS THAT ARE NOT CLEARLY NUMBERED WILL NOT BE MARKED.
9. KEEP SUB-SECTIONS OF QUESTIONS TOGETHER.
10. ANY ROUGHWORK NOT TO BE MARKED MUST BE CANCELED WITH A SINGLE DIAGONAL LINE.
11. ANSWER EVERY QUESTION ON A NEW LINE, TOP-DOWN, NOT ALL OVER THE PAGE.

QUESTION 1 - RADIO COMMUNICATIONS

1.1 Sketch and explain sky waves and propose two applications. (5)

1.2 Discuss refraction in the Ionosphere and support your answer with sketches (5)

[10]

QUESTION 2 - COMMUNICATION SYSTEMS

2.1 Differentiate between modulation and demodulation. (4)

2.2 Identify and discuss four types of communication channels. (8)

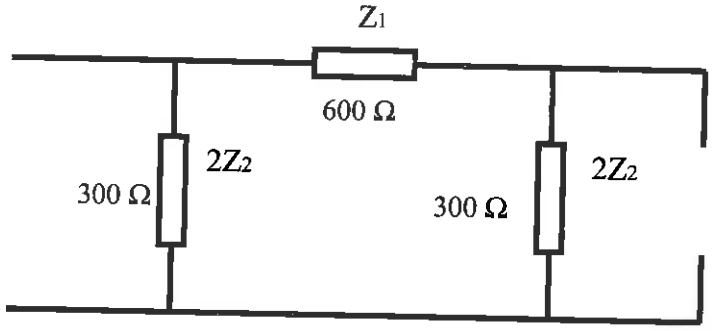
2.3 Identify and discuss five factors that should be considered in a communication system to ensure that a high standard of transmission is maintained. (10)

[22]

QUESTION 3 - FOUR TERMINAL NETWORKS

3.1 Differentiate between impedance and reactance as used in passive circuits (4)

3.2 Determine the characteristic impedance of the following π-network. (3)



3.3 Discuss attenuation coefficient. (4)

[11]

QUESTION 4 - ATTENUATORS

4.1.1 Design a T-type attenuator pad with 10 dB attenuation for a 500 Ω transmission line.
4.1.2 Sketch the π-type network (6)

4.2 Design a π section to match impedances of 800 Ohms to 175 Ohms with an attenuation of 50 dB. Draw the complete section. (6)

4.3 Design and sketch a T-type attenuator pad to give an attenuation of 15 dB and to match an impedance of 600 ohms to an impedance of 1000 Ohms. (6)

[18]

QUESTION 5 – FILTERS

5.1 Design a T-type low pass filter having a cut-off frequency of 1000 Hz for a 400 Ω transmission line. Sketch the circuits for a balanced and unbalanced network. (5)

5.2 Design a prototype high pass filter with an impedance of 600 Ω and a cut off frequency of 20 kHz. Draw both T – and π-type filters. (6)

[11]

QUESTION 6 - TRANSMITTERS AND RECEIVERS

6.1 Compile a detailed drawing for an FM transmitter and discuss the purpose of each block. (12)

[12]

QUESTION 7 - MODULATION

7.1 Compare three different considerations for single sideband transmission compared to double sideband transmission. (6)

7.2 A double side band AM transmitter gives a power output of 15 kW when 95 % modulated by a sine wave. The carrier is then 20 % speech modulated and the carrier as well as one sideband is suppressed. Calculate the mean output power in the remaining sideband. (4)

[10]

QUESTION 8 - ANTENNAS

7.1 How many directly driven elements do most Yagi antennas have? (1)

7.2 Differentiate between horizontal wave polarization and vertical wave polarization. (4)

7.3 If an antenna is made longer, what happens to its resonant frequency? (1)

[6]

TOTAL MARKS = 100