UNIVERSITY OF JOHANNESBURG

PROGRAM	:	NATIONAL DIPLOMA *ENGINEERING: ELECTRICAL*
SUBJECT	:	**ELECTRONIC COMMUNICATION II**
CODE	:	**AEC2221**
DATE	:	WINTER SSA EXAMINATION 2015 22 JULY 2015
DURATION	:	(SESSION 2) 11:30 - 14:30
WEIGHT	:	40: 60
TOTAL MARKS	:	100

EXAMINER	:	MR EM LOOTS
MODERATOR	:	MR PJJ VAN ZYL
NUMBER OF PAGES	:	5 PAGES

2059

INSTRUCTIONS : NON-PROGRAMMABLE CALCULATORS PERMITTED.

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. ANSWERS WITH NO UNITS ARE 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 CANCELLED WITH A SINGLE DIAGONAL LINE.
11. WRITE EVERY QUESTION ON A NEW LINE, TOP-DOWN, NOT ALL OVER THE PAGE.
12. NEGATIVE MARKING WILL APPLY IF INSTRUCTIONS ARE NOT FOLLOWED.

QUESTION 1 - RADIO COMMUNICATIONS

1.1 Sketch and explain space waves and propose three applications. (5)

1.2 Discuss the term decibel and where it will be used in audio engineering (5)

1.3 State the frequency ranges for the following frequencies. Also include one use for each designated range:

1.3.1 Very high frequency (VHF)

1.3.2 Ultra-high frequency (UHF)

1.3.3 Super-high frequency (SHF)

1.3.4 Extremely high frequency (EHF) (12)

[22]

QUESTION 2 - ATTENUATORS

2.1 An attenuator pad receives a signal of 80 mW and delivers an attenuated output of 40 mW.
Examine and calculate the dB rating of the pad. (3)

2.2 A certain attenuator receives 15 Watt and delivers 2, 5 Watt.
What is the attenuation of the pad in Nepers and Decibels? (5)

2.3 Design and sketch a bridge-T attenuator having an attenuation of 40 dB when working between impedances of 600 ohms. (6)

2.4 Derive the value of "N" in terms of R_1 and R_2 (4)

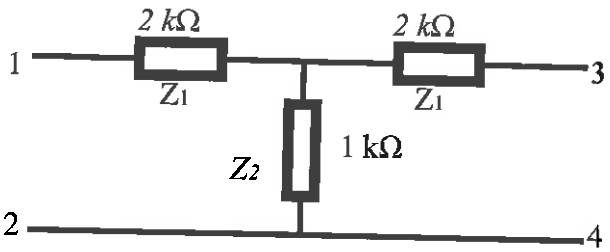
[18]

QUESTION 3 - FOUR TERMINAL NETWORKS

3.1 Derive the characteristic impedance Zo = Z_{OT} for a symmetrical T-network in terms of Z_1 and Z_2. (6)

3.2 Differentiate between asymmetrical and symmetrical networks. (5)

3.3 Determine the characteristic impedance of the following "T"-network (3)



3.4 Design and sketch a "L" type asymmetrical network to match a generator with output impedance of 600 Ω and an input impedance of 50 Ω (4)

[18]

QUESTION 4 - TRANSMITTERS AND RECEIVERS

4. Compile a detailed block diagram for an AM transmitter and explain the purpose and function of each block.

[12]

QUESTION 5 - FILTERS

5.1 Differentiate between a low pass filter and a high pass filter. Sketch the correct circuits by making use of capacitors and inductors and illustrate the attenuation/frequency characteristics. (6)

5.2 Design a T- as well as π-type high pass filter to pass all frequencies above 2000 Hz. Draw both filters when Zo = 750 Ω. (4)

[10]

QUESTION 6 - MODULATION

6.1 A certain FM transmitter operates with a maximum frequency deviation of 75 kHz and reproduces audio signals up to 15 kHz. Determine:

6.1.1 The deviation ratio

6.1.2 The minimum bandwidth required

6.1.3 If an AM transmitter operates at 75 % modulation, find the power transmitted should the carrier power be 8 kW. (6)

6.2 Propose four different types of modulation which may be used in a communication network. (4)

[10]

QUESTION 7 – INTERFERENCE

7.1 Discuss the meaning of receiver overload. (2)

7.2 What type of filter should be connected to a TV receiver as the first step in trying to prevent RF overload from an amateur HF station transmission? (2)

7.3 Discuss how one can reduce cross-modulation. (2)

7.4 How can you minimize the possibility of audio rectification of your transmitter's signals? (2)

7.5 Stereo speaker leads often act as antennas to pick up RF signals. Discuss how this effect can be minimized. (1)

7.6 What are spurious emissions? (1)

[10]

TOTAL = 100