FIJI NATIONAL UNIVERSITY
College of Engineering, Science & Technology

SCHOOL OF ELECTRICAL AND ELECTRONIC ENGINEERING
TRADE DIPLOMA IN ELECTRONIC ENGINEERING

EEE563 – RADAR & MICROWAVE.

FINAL EXAMINATION – TRIMESTER 3 - 2015.

TIME: TBA **DURATION: 3 HOURS** **Date: TBA**

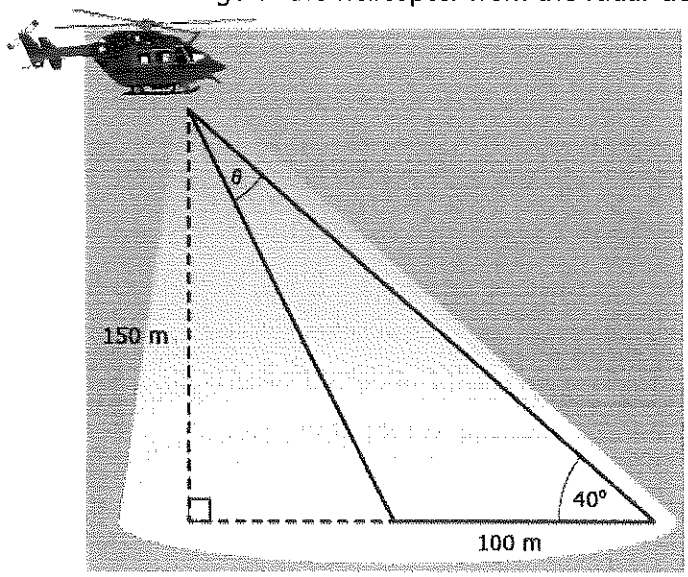
INSTRUCTIONS TO STUDENTS:

1. You are allowed 10 minutes **EXTRA** as reading time during which you are **NOT** to write.
2. Begin each answer on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscap, graph paper, drawing paper, etc. in their correct sequence and secure well.
5. For all sheets of paper on which rough/draft work has been done, cross it through and attach to your answer scripts.
6. Show all workings where necessary
7. Diagrams and graphs can be drawn in pencil.
8. Non- programmable calculators are allowed.
9. **ATTEMPT ALL QUESTIONS**
10. **Check your work before you leave the room!!**

Section A (20 marks)

Question 1

a) What does the term Radar mean? **(1 mark)**
b) Explain the basic concepts regarding radar? **(3 marks)**
c) Calculate the Range of the helicopter from the radar detection point? **(4 marks)**



Question 2

a) Draw and explain the block diagram of a basic radar system? **(12 marks)**

Section B

Question 1

a) Name the 2 types of radar transmission methods? **(2 marks)**
b) Explain how Pulse Radar system works? **(5 marks)**
c) If a RADAR has a pulse width of 20 microseconds and a recovery time of 1 microsecond, what is the minimum range. Comment on your answer? **(3 marks)**

Question 2

a) Explain how Continuous Pulse works? **(5 marks)**
b) Explain how the Doppler Effect works? **(5 marks)**

Section C **(20 marks)**

Question 1

a) A enemy warship chases a radar boat with a speed of 100.0 m/s, while chirping at a frequency of 950.0 Hz. What frequency of sound does the radar boat hear as it runs away from the enemy warship with a speed of 150.0 m/s? **(5 marks)**
b) What is the maximum unambiguous range for radar with a PRF of 490 Hz? What PRF is required for maximum unambiguous range of 376 km? **(5 marks)**

Question 2

a) What is a waveguide **(1 marks)**
b) Name three types of waveguides **(3 marks)**
c) Name the three modes of wave propagation through a waveguide **(3 marks)**
d) What is a rectangular waveguide and give one application **(3 mark)**

Section D **(20 marks)**

Question 1

a) What is the function of microwave tubes **(2 marks)**
b) Name the two types of microwave tubes? **(2 marks)**
c) Draw and label a simple klystron tube? **(4 marks)**
d) what frequency does the klystron tube generate **(2 marks)**

Question 2

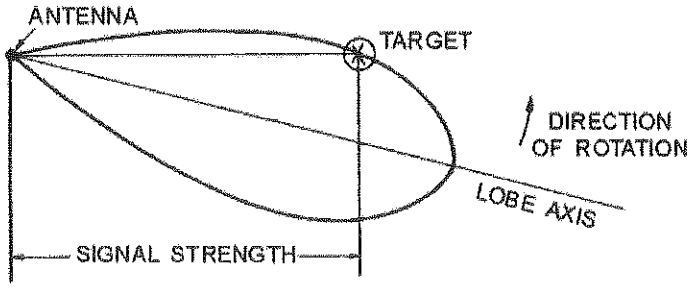
a) A radar with a frequency modulated sweeps from 400 MHz to 800 MHz in 10 ms. what is the maximum unambiguous range which can be measured by this radar? **(3 marks)**
b) For the Doppler Effect, a car is travelling towards you at 16 m·s-1 sounding its hooter with a frequency of 320Hz. The velocity of sound is 330m·s-1. What is the frequency of the sound that you will hear? **(3 marks)**
c) A radar positioned on a border security boat detects an illegal fishing boat coming towards them emitting a frequency of 1500Hz. What frequency will be shown on the radar display if the illegal boat is travelling at 80m/s? Comment also on your answer? **(4 marks)**

Section E **(20 marks)**

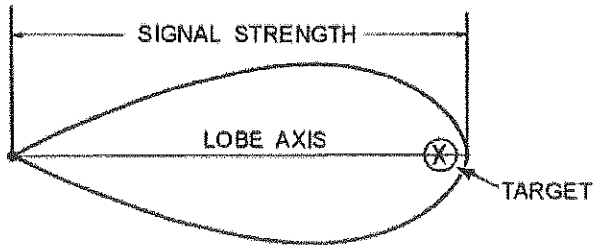
Question 1

a) Explain why radar beam transmission is important in radar applications **(2 marks)**

b) Explain the antenna positions A and B below in terms of the returned signal strength or echo **(6 marks)**

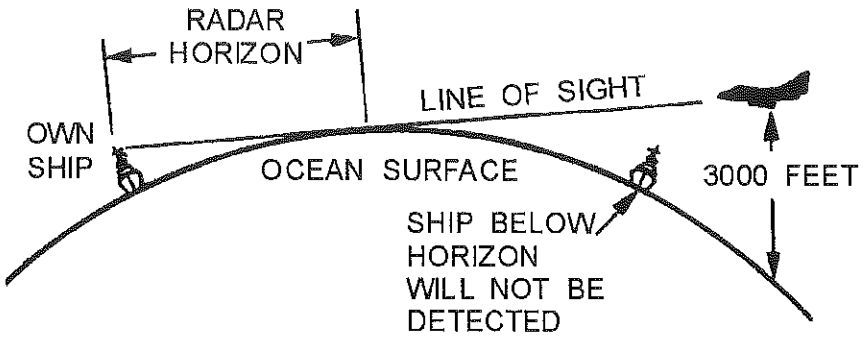


ANTENNA IN POSITION A



ANTENNA IN POSITION B

c) A ship below the horizon cannot be detected by your own ship's radar antenna at height 64 feet, calculate the horizon distance? **(2 marks)**



Question 2

a) Explain why microwave frequency is associated to radar operation? **(2 marks)**

b) If the elapsed time for an echo is 62uS then what is the distance in miles **(2 marks)**

c) If the average peak power is 20 KW, PW = 20uS and PRF is 1000 pulse/sec, what is the peak power. **(6 marks)**

----------THE END----------

10-Nov-2015

Fiji National University

Class Listing

School of Electrical & Electronics Engineering | Samabula | Trimester3 | 2015

EEE563 **Radar and Microwave** NL

StudentID	Name	Status	Mon	Sponsor	Outstanding Fee
Trade Diploma in Electronics Engineering(Telecommu					
2014120335	Adarsh Prashant Singh	ER			1,649.00
2014120633	Inoke Nakacia	EA			
2011005459	Richard Rayboy	EA		Solomon Island Government - Full	
2014122399	Upsy Nawai	ER		Tertiary Education Loan Scheme (Existir	2,124.00
2013116667	Vishal Vinal Kumar	ER		Tertiary Education Loan Scheme 2015 -	1,836.00
2014119759	Vitesh Varan Sami	ER		Tertiary Education Loan Scheme (Existir	1,649.00
2010002590	Waisea Numileva Rakasivi Koroisave	ER		Tertiary Education Loan Scheme (Existir	1,840.00
		7		**Total Owing:**	**9,098.00**
	Total Count:	7		**Grand Total:**	**9,098.00**