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 2 - 2016.

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

INSTRUCTIONS TO STUDENTS:

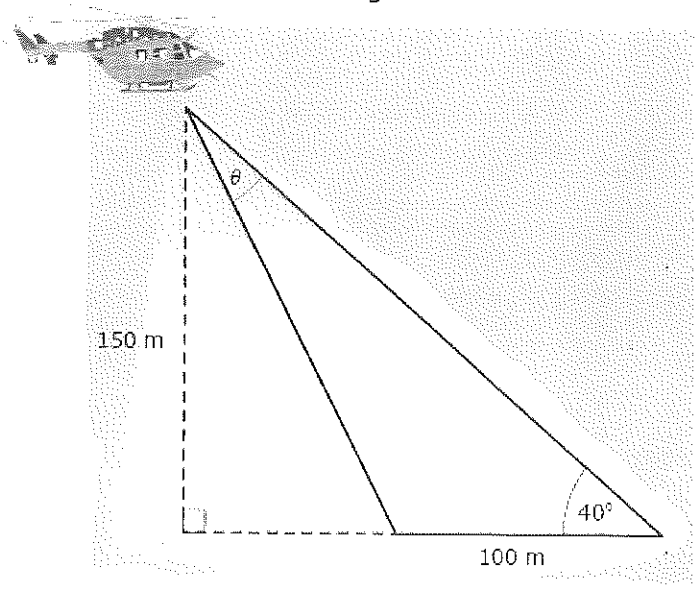
1. You are allowed 10 minutes **EXTRA** as reading time during which you are **NOT** to write.
2. Begin each answer on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscap, graph paper, drawing paper, etc. in their 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) Radar is an acronym for? **(1 mark)**
b) What is the main function of a radar system? **(3 marks)**
c) What is the elevation angle from the diagram below? **(2 marks)**
d) what is the altitude in the diagram below **(2 marks)**



Question 2

a) Draw the block diagram of a Pulse Radar system? **(6 marks)**
b) Draw the block diagram of a Continuous Radar system **(6 marks)**

Section B

(20 Marks)

Question 1

a) Explain how a Pulse Radar system works? **(6 marks)**
b) Explain how a Continuous Radar system works? **(6 marks)**

Question 2

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

Section C (20 marks)

Question 1

a) A radar set with a prf of 1,000 pps and an antenna rotation rate of 15 rpm produces what maximum number of pulses per degree? **(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) For the dominant mode propagated in an air filled circular waveguide, the cut – off wavelength is 10 cm. Find;

(i) The required size or cross sectional area of the guide and **(4 marks)**

(ii) The frequencies that can be used for this mode of propagation **(2 marks)**

b) What is the basic mechanism of the Ground Penetrating Radar System? **(4 marks)**

Section D (20 marks)

Question 1

a) What is a microwave tube? **(2 marks)**

b) Name the two types of linear beam tubes? **(2 marks)**

c) Name the two types of microwave signal sources that generate power and their respective frequency? **(4 marks)**

Question 2

a) A naval boat moving at 200m/s blowing its horn at a frequency of 1.5 kHz chases an enemy boat moving at a speed of 180m/s. what is the frequency that is generated by the enemy boat while trying to alert its comrades nearby. **(4 marks)**

b) A radar positioned on a border security hails its alarm at a frequency of 400Hz to an illegal fishing boat coming towards them emitting a frequency of 600Hz. What will be the speed of this illegal boat shown on the radar? **(4 marks)**

c)

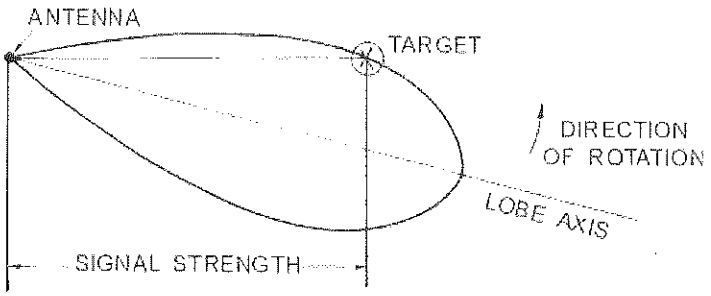
d) A radar gun generates a frequency of 370Hz detects an oncoming car from the reflected frequency measuring 830Hz. What is the speed of the car that is detected by the radar gun. **(4 marks)**

Section E (20 marks)

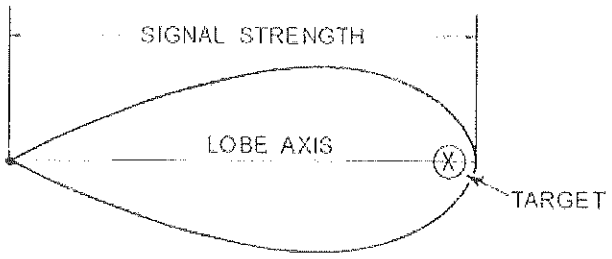
Question 1

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)**

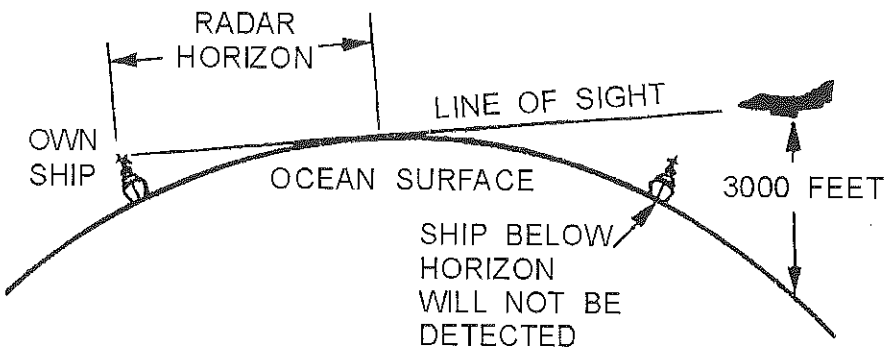


ANTENNA IN POSITION A



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? **(3 marks)**



Question 2

a) Name the 3 propagation modes of a waveguide? **(2 marks)**
b) Explain how TM mode works? **(3 marks)**
c) What is a transmission line and name its 3 elements? **(4 marks)**

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

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FNU/E-5

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Particulars		Details/Comments (To be filled by Unit Lecturer)	Tick if present on EQP (To be filled by exams staff)
Cover Page			
Fiji National University with Logo		✓	
College		✓	
School		✓	
Program		✓	
Unit Code.		✓	
Unit Name		✓	
Examination Period		✓	
Duration of Examination		✓	
Instructions			
Total Number of Pages		✓	
Other Pages			
Footer	Page Number	✓	
	Unit Code	✓	
	Examination Period	✓	
Last Page			
The End		✓	
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Examination Requirements (FNU/E-1)		✓	
Moderator's Report (FNU/E-3)		✓	
ERRS (Class List)		✓	
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