



COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY  
SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING  
CERTIFICATE IV IN ELECTRICAL ENGINEERING-STAGE 2

EEE327- MATHEMATICS FOR TRADE 2

FINAL EXAMINATION – PENSTER 4, 2016

**DAY/DATE:** \_\_\_\_\_ **TIME:** \_\_\_\_\_ **ROOM:** as per timetable.

**INSTRUCTIONS TO STUDENTS**

1. *You are allowed 10 minutes Extra reading time during which you are NOT to write.*
2. *Begin each section 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 foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with string.*
5. *For all sheets of paper on which rough/draft work has been done, cross it through and you MUST ATTACH to your answer scripts.*
6. *Write clearly the number(s) of the question(s) attempted on the top of each sheet.*
7. **ATTEMPT ALL QUESTIONS.**
8. *Show all workings where necessary.*
9. *Do not use programmable calculators, especially the ones that do the conversions of number systems.*

**ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!**

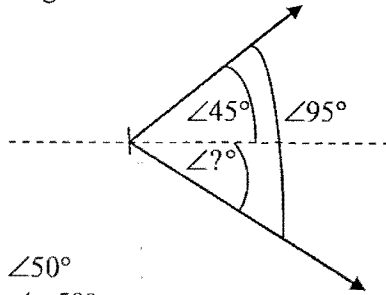
**Section A**      **Multiple Choice**    (20 marks)

**Instruction:**

Write the appropriate alphabet beside each question number.

1. How many minutes do you find in a degree?
  - a) 30
  - b) 600
  - c) 3600
  - d) 60
  
2. Choose the best answer for  $7x + 5x - 2y$ :
  - a)  $5x - 2y$
  - b)  $12x - 2y$
  - c)  $7x - 2y$
  - d)  $5x - 2y$
  
3. Which of the following is not Pythagorean Triad?
  - a) 8, 15, 17
  - b) 6, 8, 10
  - c) 13, 14, 15
  - d) 5, 12, 13
  
4. Which of the following is incorrect?
  - a) 1 revolution = 60 degree
  - b) 1 degree = 60 minute
  - c) 1 minute = 60 seconds
  - d) 1 degree = 3600 seconds
  
5. If the diameter of a circle is 223 cm; determine its radius:
  - a) 446 cm
  - b) 14.93 cm
  - c) 223 cm
  - d) 111.5 cm
  
6. To convert radians to degrees is:
  - a) Divide  $\frac{\pi}{180}$
  - b) Multiply  $\frac{\pi}{180}$
  - c) Divide  $\frac{180}{\pi}$
  - d) Multiply  $\frac{180}{\pi}$

7. The angle shown is:

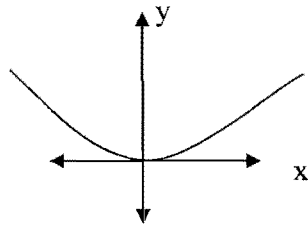


- a)  $\angle 50^\circ$
- b)  $\angle -50^\circ$
- c)  $\angle 85^\circ$
- d)  $\angle -85^\circ$

8. What is the surface area formula of a sphere?

- a)  $4 \pi r^2$
- b)  $6 a^2$
- c)  $\pi r^2$
- d)  $l^3$

9. Identify the given graph:



- a)  $y = -x^2$
- b)  $y = x^2$
- c)  $y = x^2 + 1$
- d)  $y = -x^2 - 1$

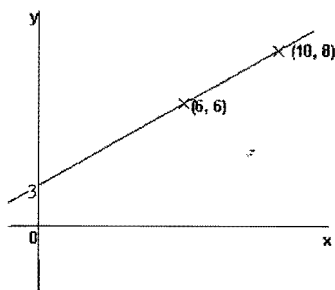
10. A circle has a radius of 2 m. Calculate its area

- a)  $12.56 \text{ m}^2$
- b)  $10.56 \text{ m}^2$
- c)  $20.56 \text{ m}^2$
- d)  $11.56 \text{ m}^2$

11. If the general equation for a linear graph is given by  $y = mx + c$ ; which component determines the slope?

- a)  $y$
- b)  $m$
- c)  $x$
- d)  $c$

12. What type of gradient is shown in the below graph



- a) Negative gradient
  - b) Infinite gradient
  - c) Zero gradient
  - d) Positive gradient
13. Using the KCL-laws, the sum of currents entering a junction is equal to?
- a) Is not equal to the sum of current leaving the junction
  - b) Is equal to the sum of current leaving the junction
  - c) Is hundred
  - d) None of the above
14. Using the KVL laws, the total voltage around a closed loop must be equal to?
- a) 0
  - b) 10
  - c) 100
  - d) None of the above
15. In the Complex general equation;  $a \pm jb$ , what is the imaginary component?
- a)  $a$
  - b)  $j$
  - c)  $\pm jb$
  - d)  $b$
16. Convert the binary  $11101010_2$  to hexadecimal
- a)  $EA_{16}$
  - b)  $EA_8$
  - c)  $AE_{16}$
  - d)  $AE_{10}$
17.  $Z_1 = 3 + j5$  and  $Z_2 = 3 + j4$ ; choose the appropriate answer for  $Z_1 + Z_2$ :
- a)  $6 + j9$
  - b)  $-11 + j17$
  - c)  $29 + j27$
  - d)  $3 + j5$

18. Identify a hexadecimal number:

- a)  $17_8$
- b)  $17_2$
- c)  $17_{10}$
- d)  $17_{16}$

19. Name the quantity that has magnitude and direction:

- a) Scalar
- b) Vector
- c) Mass
- d) Litre.

20.  $(45\angle 12^\circ)(46\angle -10^\circ)$  is equal to:

- a)  $\frac{45}{46}\angle 22^\circ$
- b)  $2070\angle 2^\circ$
- c)  $91\angle 2^\circ$
- d)  $-1\angle 22^\circ$

### **SECTION B:**

**(20 marks)**

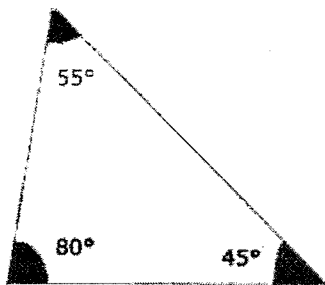
**Instruction:**

*Show workings where necessary.*

1. Transform the following formulae to make the named term the subject.

$$C = \frac{A}{4\pi d} \quad [d] \quad (2 \text{ marks})$$

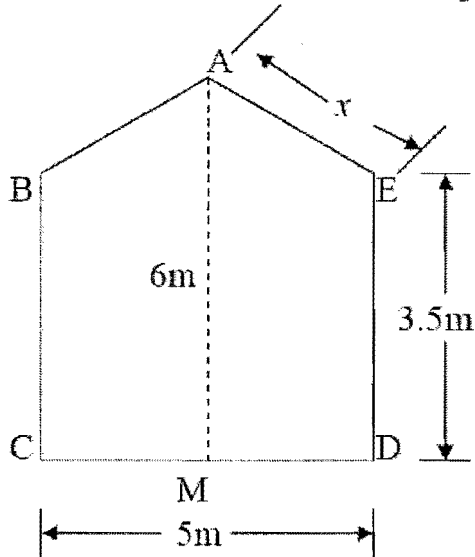
2. What is the correct name for the following shown triangle?



(1 marks)

3. A hut has the dimensions shown in the diagram; calculate the sloping length  $x$  of the roof.

(6 marks)



4. Convert the following radians to degrees

$$\frac{\pi}{6}$$

(1.5 marks)

5. Convert the following angle to degrees and decimals of a degree, to 3 dp:

$$29^\circ 12' 35''$$

(1.5 marks)

6. Convert the following angles into degrees, minutes and seconds:

$$18.3^\circ$$

(1 marks)

7. State the general name for the following angles:

(a).  $163^\circ$

(1 marks)

(b).  $215^\circ$

(1 marks)

8. Find the angle complementary to the following:

(a).  $37^\circ$

(1 marks)

(b).  $49^\circ 51'$

(1.5 marks)

9. Find the angle supplementary to the following:

(a).  $16^\circ$

(1 marks)

(b).  $138^\circ 23'$

(1.5 marks)

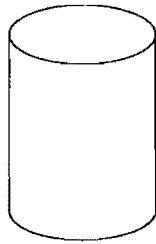
**SECTION C:**

**(20 marks)**

**Instruction:**

*Show working where necessary.*

1. Determine the amount of fuel in liters needed for the following tank to be full:  
(4 marks)



$\phi$  6 cm & height = 50mm

2. Tank was full at odometer reading 37250 and is refilled with 12 gallons at an odometer reading of 37500.

Cost per gallon of regular fuel is \$1.00

Cost per gallon of premium fuel is \$1.20

- A. How many miles were travelled on one tank of fuel?  
(2.5 marks)
- B. What was the MPG?  
(2 marks)
- C. If the cost of fuel was \$14.40. What type of fuel was purchased?  
(2.5 marks)
- D. How many miles can this car be driven on 15 gallons of fuel?  
(2 marks)
3. Use the factoring method to solve the following quadratic equation.
- a)  $x^2 - x - 4 = 2$  (2 marks)
- b)  $x^2 - 24 = 5x$  (2 marks)
4. Use the completing the square method to solve a quadratic equation
- a)  $x^2 + 4x - 2 = 0$  (3 marks)

**SECTION D:****(20 marks)****Instruction:***Show working where necessary.*

1. Use elimination method to solve the simultaneous equations:

$$\begin{array}{ll} 3x + 4y = 5 & \text{eq (1)} \\ 2x - 5y = -12 & \text{eq (2)} \end{array} \quad (4 \text{ marks})$$

1. Sketch the graphs of:

a.  $y = -x^2$  (2mark)

2. Determine the gradient of the straight line graph passing through the co-ordinates

a. (-2, 5) and (3, 4) (2 mark)

b. (-2, -3) and (-1, 3) (2 mark)

3. Sketch a parabola from the equation  $y = 2x^2 - 12x + 13$  (10 marks)

**SECTION E:****(20 marks)****Instruction:***Show working where necessary.*

1. Convert the following binary numbers to decimal:

a).  $110011_2$  (3 marks)

b).  $101010_2$  (3 marks)

2. Convert the following decimal numbers to a binary number:

a)  $13_{10}$  (3 marks)

b)  $37_{10}$  (3 marks)

3. Convert  $6 + j8$  to polar form (2 marks)

4. Add  $6 + j8$  to  $10 - j2$  (2 marks)



5. What is the product of  $6 + j8$  and  $10 - j2$  (2 marks)

6. Subtract  $6 + j8$  from  $10 - j2$  (2 marks)