



FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

CERTIFICATE IV IN ELECTRONICS ENGINEERING-Stage 1
CERTIFICATE IV IN ELECTRICAL ENGINEERING-Stage 1

EEE301- MATHEMATICS FOR TRADE 1

FINAL EXAMINATION – PENSTER 3, 2017

Day/Date: As per timetable Time: As per timetable 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 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 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 though 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. ANSWER ALL QUESTIONS.
8. Show all workings where necessary.
9. Do not use programmable calculators, especially the ones that does the conversions of number systems.
10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!**

Section A**Multiple Choice****[20 Marks]**

- 1) The standard form of 0.032 is:
 - A) 0.32×10^2
 - B) 3.2×10^{-2}
 - C) 3.2×10^2
 - D) $32. \times 10^{-3}$

- 2) $\frac{2}{3}$ is an example of
 - A) Proper fraction
 - B) Improper fraction
 - C) Mixed fraction
 - D) All of the above

- 3) $x^2 - 4$ is equivalent to
 - A) $(x-2)(x-2)$
 - B) $-2 - x^2$
 - C) $(x-2)^2$
 - D) $(x-2)(x+2)$

- 4) $a(c + d)$ is equal to
 - A) acd
 - B) $ac + ad$
 - C) $ac + d$
 - D) $a + c + d$

- 5) The number of significant figures in 2.1×10^3 is
 - A) 4
 - B) 0
 - C) 2
 - D) 5

- 6) Which of the following are supplementary angles?
 - A) 0° and 90°
 - B) 160° and 200°
 - C) 89.1° and 90.9°
 - D) 36° and 54°

- 7) A turner machines a pin to 15.78mm diameter when it should have been 15.87mm diameter. What is the percentage error?
 - A) 0.57%
 - B) 0.09%
 - C) 57%
 - D) 9%

- 8) The total surface area of a sphere is equal to:
- A) $2\pi r$
 - B) $4\pi r^2$
 - C) πr^2
 - D) $4\pi r$
- 9) Which of the following is **not** a Pythagorean Triad?
- A) 3,4,5
 - B) 30,40,50
 - C) 8,15,16
 - D) 6,8,10
- 10) Identify the term that best describes one quarter of a whole circle:
- A) Chord
 - B) Sector
 - C) Quadrant
 - D) Segment
- 11) From the equation $2y = 4x - 8$, determine the gradient.
- A) 4
 - B) 0.5
 - C) -8
 - D) 2
- 12) The crest factor for the graph $i = \sin \theta$ is:
- A) 1.414
 - B) 0.707
 - C) 1.11
 - D) 0.637
- 13) Which of the following is correct?
- A) 1 revolution = 60 degrees
 - B) 1 second = 60 minutes
 - C) 1 revolution = 360 degrees
 - D) 1 minute = 60 degrees
- 14) State the general name for the angle 215° .
- A) Acute angle
 - B) Reflex angle
 - C) Obtuse angle
 - D) Right angle
- 15) Which of the following is true for isosceles triangle?
- A) All sides are equal
 - B) No sides are equal
 - C) One angle is right-angle
 - D) Two angles are equal

16) 1 radian is equivalent to:

- A) 2π
- B) $360^\circ/2\pi$
- C) π
- D) $180^\circ/2\pi$

17) $(5 \angle 25^\circ) (2 \angle 15^\circ)$ is equal to

- A) $10 \angle 375^\circ$
- B) $7 \angle 375^\circ$
- C) $7 \angle 40^\circ$
- D) $10 \angle 40^\circ$

18) What is the Argand of the following vector?

$$z = 2.5 + j4.5$$

- A) 2.57
- B) 5.15
- C) 7.0
- D) 25.6

19) Which quantity has both magnitude and direction?

- A) Scalar quantity
- B) size
- C) Vector quantity
- D) Scale quantity

20) Which of the following is a complementary angle to 57 degrees?

- A) 33 degrees
- B) 90 degrees
- C) 303 degrees
- D) 123 degrees

SECTION B**USE OF CALCULATOR****[45 MARKS]**

1. Find the value of $\frac{11}{3} - \frac{13}{6}$. Leave the answer in mixed number. (2 marks)
2. Express the following in standard form: (2 marks)
 - a. 448.3
 - b. 0.00000355
3. A German silver alloy consists of 60% copper, 25% zinc and 15% nickel. Determine the masses of the copper, zinc and nickel in a 6.4 kilogram block. (3 marks)
4. Evaluate and show the workings for the following: (3 marks)
 - a. $2^2 \times 2^3$
 - b. $4^2 \times 4^4 \times 4$
5. Express in the standard form: (2 marks)
 - a. 68.71
 - b. 4746
6. Find the averages of the following numbers: 55 cm, 3 m, 5.04 m, 456 cm, 89.04 cm and 34 m. (2 marks)
7. A piece of metal bar 120cm long is cut in the ratio of 7:3. Find the length of the two pieces. (2 marks)
8. When mixing the materials for a concrete floor, the ratio of sand to gravel to cement is 3:4:1 that is 3 parts of sand to 4 parts of gravel to 1 part of cement. Find the volume of gravel in a cubic meter of mix? (3 marks)
9. The electrical resistance of a wire 150mm long is 2 ohms. Find the resistance of a similar wire which is 1m long. (3 marks)
10. Two shafts are to rotate at 170rev/min and 300rev/min respectively. A 150mm diameter pulley is fitted to the slower shaft and by means of a belt it drives a pulley on the faster shaft. What diameter pulley is required on the faster shaft? (3 marks)
11. A piece of metal of mass one and quarter kg is machined down to a block of mass 850grams. What percentage of the original mass has been removed? (3 marks)
12. Factorize $15ab + 24bc$ (3 marks)
13. Factorize $4x^2 - y^2$ (4 marks)
14. Find the distance s (m) when $s = \frac{1}{2}gt^2$ given the time $t = 0.047s$ when the acceleration $g = 9.81m/s^2$. (3 marks)
15. Add $25^\circ 37' 51''$ and $41^\circ 29' 16''$. (2 marks)

16. Convert $\pi/15$ radians to degrees. (2 marks)
17. Convert 3.912 radians into degrees, minutes and seconds. (2 marks)
18. Find the angle supplementary to 52° . (2 marks)

SECTION C

Show all necessary working.

[35 MARKS]

1. Arrange the following in ascending order using the common denominator method.
 $\frac{1}{2}, \frac{4}{5}, \frac{5}{12}, \frac{4}{30}, \frac{1}{6}$ (1.5 marks)
2. Find the value of $\frac{3}{8} + \frac{5}{6} + \frac{7}{16}$. (1.5 marks)
3. A pay rise of 4.5% is paid to a man earning \$150 a week. Determine how much he will then earn. (2 marks)
4. Express the following in standard form: (2 marks)
 - i) 0.002
 - ii) 0.0000713
5. Determine the number of significant figures in the following: (2 marks)
 - i) 3.0
 - ii) 2640
6. A main shaft is running at 300rev/min and a machine is to be installed driven directly from the shaft, to run at 180rev/min. The pulley on the machine is 230 mm diameter. What diameter of pulley will be required on the shaft to drive the machine? (3 marks)
7. Multiply together $\frac{3a}{5}, \frac{35b}{48}$ and $\frac{4c}{9}$ (2 marks)
8. Factorize the following: (3 marks)
 - i) $15ab + 24bc$
 - ii) $9x^2 - y^2$
9. When two resistors R_1 and R_2 are connected in parallel the voltage across R_2 may be found from $V_2 = [R_1 R_2 / (R_1 + R_2)] I$, where I is the total circuit current. Find R_2 given $I = 14A$, $R_1 = 5\Omega$ and $V_2 = 20V$. (2 marks)
10. Make d the subject of the formula from the equation $C = A/4\pi d$ (2 marks)
11. Solve $2(x+6) - (x-2) = 3(8-x)$ (2 marks)
12. Find the value of s from the formula if $u = 17$, $v = 6$ and $t = 9$.
$$s = \frac{(u - v)\sqrt{t}}{2}$$
 (4 marks)
13. Using quadratic equation, solve $6x^2 + 5x - 6 = 0$ (3 marks)

14. The weekly wage bill for three instructors and thirty apprentices in a mechanical training workshop is \$4341. In an electrical training centre the wage bill is \$2664 for two instructors and eighteen apprentices. If the five instructors each receive the same pay, and the forty-eight apprentices each receive the same pay, calculate the weekly wage of an instructor and the weekly wage of an apprentice. (5 marks)

.....THE END.....