



COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

CERTIFICATE IV IN ELECTRICAL ENGINEERING

CERTIFICATE III IN ELECTRICAL ENGINEERING

EEC301- ELECTRICAL CALCULATIONS 1

FINAL EXAMINATION – QUARTER 2, 2019

DURATION – 2 HOURS AND 10 MINUTES

TOTAL MARKS – 100

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 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 do the conversions of number systems.
10. Total number of pages: 7

SECTION A**MULTIPLE CHOICE****[15 MARKS]**

1. Express $5/13$ as a percentage correct to three significant figures.

- A. 38.5%
- B. 38.46%
- C. 38%
- D. 38.461%

2. $(b + c)(a + c)$ is equal to

- A. $b(a + c) + c(a + c)$
- B. $b^2 + ac + bc + ba$
- C. $c^2 + ba + ca + b^2$
- D. $a(b + c) + c(a + c)$

3. 0.00258 written in standard form is:

- A. 2.58×10^3
- B. 25.8×10^{-4}
- C. 25.8×10^4
- D. 2.58×10^{-3}

4. Which of the following is a supplementary angle to 123° ?

- A. 43°
- B. 57°
- C. 93°
- D. 203°

5. Transpose V from $P = V^2R$:

- A. $V = P/R$
- B. $V = 2\sqrt{(P/R)}$
- C. $V = \sqrt{(P/R)}$
- D. $V = \sqrt{PR}$

6. $3(c + d)$ is equal to

- A. $3cd$
- B. $3c + 3d$
- C. $3c + d$
- D. $3 + c + d$

7. Given $A = 2 + j2$ and $B = 5 - j3$ determine $A + B$

- A. $12 + j4$
- B. $-3 + j2$
- C. $7 - j$
- D. $-1 - j$

8. $1/8$ is an example of:

- A. Mixed fraction
- B. Improper fraction
- C. Proper fraction
- D. All of the above

9. Express 0.3716 in standard form.

- A. 3.716×10^{-1}
- B. 0.3716×10^{-2}
- C. 31.76×10^4
- D. 3.176×10^{-3}

10. $6^3 \times 6^5$ in the simplest form using indices is

- A. 6^{-2}
- B. 6^{15}
- C. 6^8
- D. 6^1

11. A fruit seller had some apples. He sells 40% apples and still has 420 apples. Originally, he had:

- A. 588 apples
- B. 600 apples
- C. 672 apples
- D. 700 apples

12. The diameter of a circle is 14mm. Hence the area is:

- A. 15.9 mm²
- B. 159.94 mm²
- C. 195.49 mm²
- D. 150 mm²

13. What is 24.45 converted into degrees, minutes and seconds is

- A. 24°27'0"
- B. 24°17'0"
- C. 23°27'0"
- D. 24°27'0"

14. Find the volume of the sphere whose diameter is 4cm. (use $\pi = \frac{22}{7}$)

- A. 30 cm
- B. 31.25 cm
- C. 33.52 cm
- D. 35.32 cm

15. Expand $5x(2x+3)$

- A. $10x^2 + 15x$
- B. $7x + 8x$
- C. $15x^2 + 15x$
- D. $10x + 15x$

SECTION B**USE OF CALCULATOR****[10 MARKS]**Use the **calculator** to evaluate the following:

1. Express $28/95$ as a decimal fraction correct to **4 significant figures**.
2. Work out : $\frac{6}{7} - \frac{5}{9}$
3. Find the average of \$0.56, \$45.99, \$9.45, 75c, \$89.91.
4. Find S when $S = 2\pi r^2 + 2\pi rh$ where $\pi = 3.14$, $r = 3.2$ and $h = 3.5$. Leave answer correct to 4 significant figures.
5. The area of a square is 1225 m^2 . Calculate its length.
6. Express 0.00056 in standard form.
7. Find the angle supplementary to 64° .
8. Solve for x when $\sin x = 1$
9. Add $41^\circ 29' 16''$ and $25^\circ 37' 51''$
10. Convert $\frac{6}{5}$ to mixed numbers

SECTION C ARITHMETIC FUNDAMENTALS AND BASIC ALGEBRA**[25 MARKS]**

1. A pay rise of 5.5% is paid to a man earning \$180 a week. Determine how much he will then earn? (2 marks)
2. Work out the following expressions: (3 marks)
 - a. $4\frac{2}{6} \times 2\frac{2}{5}$
 - b. $1\frac{3}{4} \div 2\frac{4}{5}$
3. Express the following in standard form: (2 marks)
 - a. 0.000417
 - b. 65.91

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4. Evaluate $8^6 \div 8^2$ show the workings (2 marks)

5. Make v the subject of the formula from the given equation.

$$s = \frac{(u+v)t}{2} \quad (2 \text{ marks})$$

6. Solve Simultaneously

$$\begin{aligned} 3x + 2y &= 4 & [\text{Use Elimination method}] \\ x - y &= 1 & (4 \text{ marks}) \end{aligned}$$

7. Solve $3x^2 - 2x - 1 = 0$ [Use quadratic equation] (4 marks)

8. A 13% discount is provided by a retail company on certain brand of TV's. If the cost of a TV is \$1500.00.

- Work out 13% of \$1500.00.
- How much would a customer pay for the TV? (4 marks)

9. Find the value of V from the formula if $R = 4.5\text{cm}$ and $H = 150\text{mm}$ [use $\pi = \frac{22}{7}$]

$$V = \frac{1}{3}\pi R^2 H \quad (2 \text{ marks})$$

SECTION D **MEASUREMENTS AND GRAPHS** **[25 MARKS]**

1. Find the gradient, co-ordinates of x-intercept, y-intercept and sketch the graph for the following equations:

- $y = 4x + 2$ (5 marks)
- $3x + 2y - 4 = 0$ (5 marks)

2. Find the x – intercepts, y – intercepts, turning point and sketch the graphs of the following quadratic expression: $y = x^2 - 6x + 5$ (5 marks)

3. When the maximum value of an alternating voltage is 30V, determine: (5 marks)

- Average value?
- Peak value?
- R.M.S. value?
- Peak – to – peak value?
- Draw AC waveform

