



**FIJI NATIONAL UNIVERSITY**

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY

**SCHOOL OF ELECTRICAL & ELECTRONIC ENGINEERING**

CERTIFICATE III IN ELECTRONIC ENGINEERING STAGE 2  
CERTIFICATE IV IN ELECTRONIC ENGINEERING STAGE 2  
CERTIFICATE IV IN BIOMEDICAL ENGINEERING STAGE 2

UNIT CODE: **EEC306** UNIT TITLE: **ELECTRICAL PRINCIPLES II**

**FINAL EXAMINATION - QUARTER II 2019**

**DAY/DATE:** As per T/Table

**TIME:** As per T/Table

**ROOM:** As per T/Table

**INSTRUCTION TO STUDENTS**

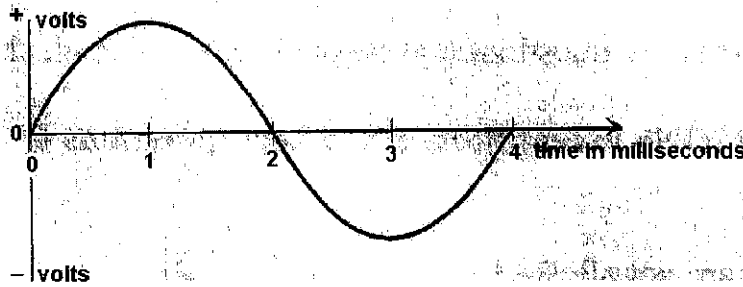
1. You are allowed 10 minutes Extra time during which You are not to write.
2. Write Your Candidate number on the top of each sheet of the answer booklet.
3. Write All your Answers in the answer booklet provided.
4. For all sheets of paper on which rough/draft work has been done, cross it through and attach these to Your answer script.
5. For section A, the answer sheet is attached to the back of this question paper which you will need to remove and insert it in your answer booklet.
6. Attempt all the Questions.



7. The point at which the battery is 90 to 95% exhausted is the:

- A. 10% point.
- B. half power point.
- C. recharge point.
- D. end point voltage.

8. The frequency of the waveform shown below is:



- A. 0.25 Hz
- B. 250 Hz
- C. 2Hz
- D. 4Hz

9. The measure of how long a battery (secondary cells) can supply a certain value of current to a load is its:

- A. load capacity
- B. peak voltage
- C. load current
- D. Ampere-hour rating.

10. \_\_\_\_\_ is a line that by its length and direction represents the magnitude and phase relationship of a.c. quantities.

- A. Reactance
- B. conductance
- C. theta
- D. phasor

11. For primary cells, the measure of how long it will be able to supply voltage is determined by its:

- A. discharge characteristics
- B. cell life
- C. amperage
- D. voltage capacity.

12. \_\_\_\_\_ is exposed to sunlight to generate energy for certain uses.

- A. Hydroelectric power
- B. Geothermal power
- C. Electrostatic forces
- D. Solar panels

13. The most common type of rechargeable cell is the:
- A. gel battery
  - B. lead –acid battery
  - C. mercury battery
  - D. button battery
14. For a *parallel* circuit, the \_\_\_\_\_ is used as a reference phasor.
- A. voltage
  - B. current
  - C. power
  - D. inductor
15. The reference phasor must always be drawn horizontal and towards the:
- A. negative domain
  - B. positive domain
  - C. right
  - D. left
16. The unit measurement for conductance is:
- A. Ohms
  - B. Siemens.
  - C. Henry.
  - D. Amps.
17. Time constant – is the time taken for a current or voltage in an RC or RL circuit to reach \_\_\_\_\_ of its final value.
- A. 75%
  - B. 90%
  - C. 100%
  - D. 63.2%
18. In purely inductive circuit connected to an alternating sinusoidal source:
- A. current leads voltage by  $90^\circ$
  - B. voltage leads current by  $90^\circ$
  - C. current lags voltage by 900
  - D. voltage and current are in phase.
19. The supply voltage, inductor voltage and capacitor voltage can not be added directly to each other because of they are of:
- A. different amplitudes
  - B. different phases
  - C. different components
  - D. different reactances.

20. A device that converts mechanical into electrical energy is?

- A. solar cell
- B. thermocouple
- C. chemical cell
- D. generator

21. In an RL parallel circuit

- A. voltage lags current.
- B. current leads voltage.
- C. voltage leads current.
- D. voltage and current are in phase.

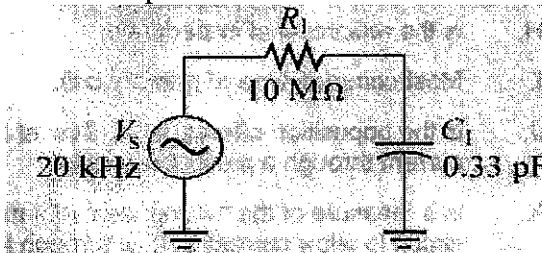
22. The component that forms the electrical connection between the rotating coil of wire in a motor and the external source of electrical energy is called the:

- A. rotor
- B. armature
- C. battery
- D. commutator

23. What form of energy is used to maintain an imbalance of charges between the terminals of a battery?

- A. Chemical energy
- B. Mechanical energy
- C. Electronical energy
- D. Solar energy

24. The impedance of the circuit shown below is:



- A.  $24.1 \text{ M}\Omega$
- B.  $10 \text{ M}\Omega$
- C.  $26.1 \text{ M}\Omega$
- D.  $0\Omega$

25. The value of current or voltage after one time constant  $\tau$  will be equal to:

- A. 36.8% of the final value
- B. 50% of the final value
- C. 63.2% of the final value
- D. 100% of the final value

**SECTION A Part II**

**TRUE OR FALSE**

**[5 MARKS]**

*Write down T if the statement is true and F if it is false in your answer booklets. 1 mark each.*

1. The carbon-zinc cell is a primary cell, and is disposed of when its chemical action has run out.
2. The positive terminal in a carbon zinc cell is made of zinc.
3. The 9V battery is made from six 1.5V cells stacked in parallel.
4. The alkaline cell is a development of the carbon-zinc cell. It has many advantages over the carbon-zinc cell, one of it is that its cheap.
5. The successful operation of a run of river hydro system may be dependent upon the weather.

**SECTION B MATCHING & SHORT ANSWER QUESTIONS**

**[30 MARKS]**

1. Sketch appropriate diagrams to briefly explain how the electrical energy is derived from the following renewable energy sources:

a) Hydro power

b) Solar power

c) Biomass energy (5 marks each)

2. Draw the waveform of an alternating current and indicate all the parameters below:

a) peak value,

b) peak-to-peak,

c) instantaneous value,

d) average value and the

e) RMS value. (1 mark each)

3. Give two Characteristics of a battery? (2 marks)

4. Explain what are secondary cells and write down the advantages and disadvantages you know. (3 marks)

5. An alternator is an electromechanical device that converts mechanical energy to alternating current electrical energy. Using appropriate diagrams, briefly explain how electricity is produced in an alternator. (5 marks)





**SECTION D                  CALCULATIONS                  [20 MARKS]**

*Show all necessary working where applicable.*

1. An alternating voltage is represented by the expression  $v = 35 \sin 314.2t$  volt.

Determine the following:

- a) Maximum value, (2 mark)
- b) Frequency, (2 marks)
- c) Period of the waveform. (2 marks)

2. A resistor of  $250\Omega$  is connected in series with a 1.5 H inductor, across a 100V, 50 Hz supply.

Calculate the:

- a) inductive reactance (2 mark)
- b) impedance (2 mark)
- c) current flowing in the circuit (2 mark)
- d) voltage drop across the resistor (2 mark)
- e) phase angle between the current and the applied voltage. (2 mark)

3. A coil having a resistance of 4 ohm and a constant inductance of 2H is switched across a 20V dc supply. Calculate the

- a). time constant. (1 mark)
- b). final value of the current. (1 mark)
- c). value of the current 1.0s after the switch is closed. (2 marks)

**End of Examination**

