



Qualification Code : 071105T4IPO  
Qualification : Industrial Plant Operations Level 5  
Unit Code : ENG/OS/IPO/CC/03/5/A  
Unit of Competency : Apply Electrical Principles

## WRITTEN ASSESSMENT

### INSTRUCTIONS TO CANDIDATE

Time allocated: **3 HOURS**

This paper consists of **THIRTY THREE** questions in **THREE** **SECTIONS; A, B** and C.

Answer **ALL** questions in section A and B and any other **TWO** questions in section **C**.

Marks for each question are indicated in the brackets.

You are provided with a separate answer booklet.

Do not write on this question paper

Ensure that you have a non-programmable scientific calculator

All answers should be responded in English

*This paper consists of 8 printed pages. Candidates should check the questions paper to ascertain that all the pages are printed as indicated and that no questions are missing*

*Turn Over*

**Section A [20 Marks]**

*In this section, each correct answer is 1 mark*

1. Determine the power dissipated by a resistor of  $10\Omega$  when a current of  $2A$  passes through it.
  - A.  $0.4W$
  - B.  $20W$
  - C.  $40W$
  - D.  $200W$
2. A charge of  $240C$  is transferred in 2 minutes. The current flowing is\_\_\_\_\_.
  - A.  $120A$
  - B.  $420A$
  - C.  $2A$
  - D.  $8A$
3. The ohm is the unit of\_\_\_\_\_.
  - A. Power
  - B. Charge
  - C. Resistance
  - D. Current
4. What is the equivalent of  $30\mu s$ ?
  - A.  $0.03$
  - B.  $3000minutes$
  - C.  $0.00003s$
  - D.  $0.3s$
5. What is the energy used by  $3kW$  heater in 10 minutes?
  - A.  $10J$
  - B.  $5J$
  - C.  $900J$
  - D.  $15000J$
6. Which one of the following expression for electrical power is correct?

- A. VI
  - B. V/I
  - C.  $I^2 R$
  - D. V/R
7. For proper earthing, what should be the maximum value of earth resistance while carrying out the testing of earth continuity path?
- A. 1  $\Omega$
  - B. 2  $\Omega$
  - C. 5  $\Omega$
  - D. 10  $\Omega$
8. Which material is used in plate earthing ?
- A. Wood coal
  - B. Salt and earthing plate
  - C. All the above
  - D. None of the above
9. In house wiring, black and green wires indicate\_\_\_\_\_.
- A. Earth and neutral respectively
  - B. Phase and neutral respectively
  - C. Phase and earth respectively
  - D. Neutral and earth respectively
10. The earthing electrodes should be placed within what distance in meters from the building whose installation system is being earthed?
- A. 4
  - B. 2.5
  - C. 1.5
  - D. 0.5
11. The power factor of an AC voltage lies between \_\_\_\_\_.
- A. 1 and 2
  - B. 0 and 1
  - C. 3 and 4
  - D. 2 and 3

**Turn Over**

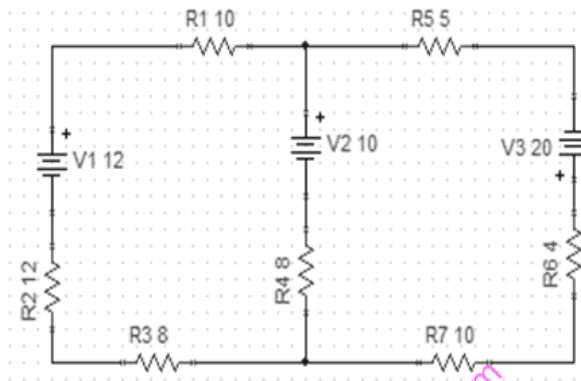
12. The alternating current voltage has \_\_\_\_\_.
- A. Phase
  - B. Neutral
  - C. Phase and Neutral
  - D. None of the above
13. Which one of the following current is obtained from a generator?
- A. Direct current
  - B. Alternating current
  - C. Both direct and alternating current
  - D. None of the above
14. The force between two charges is 120N if the force between the two charges is doubled, what will be the force?
- A. 60N
  - B. 30N
  - C. 40N
  - D. 15N
15. The lines of force due to charged particle are \_\_\_\_\_.
- A. Always straight
  - B. Always curved
  - C. Sometimes curved
  - D. Sometimes straight
16. The direction of electric field due to positive electric charge is \_\_\_\_\_.
- A. Away from the charge
  - B. Towards the charge
  - C. Both A. and B.
  - D. None of the above
17. If the sheet of bakelite is inserted between the plates of air capacitor the capacitance will \_\_\_\_\_.
- A. Increase
  - B. Decrease
  - C. Remain unchanged

D. Becomes zero

18. A capacitor stores charge of 0.44C at 10V. What is its capacitance?

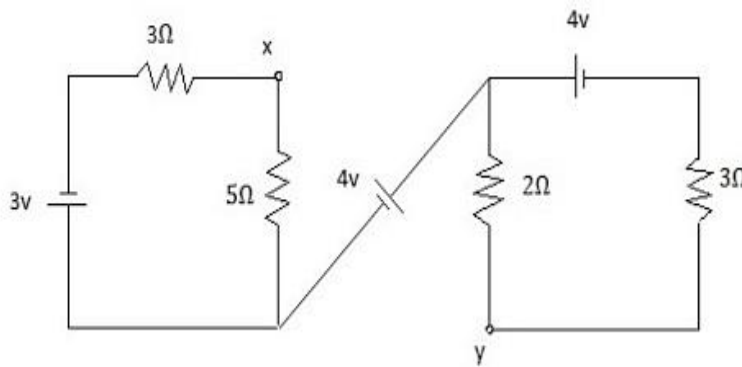
- A. 0.044F
- B. 4.4F
- C. 0.22F
- D. 0.8F

19. For the circuit below current flowing through each branch is\_\_\_\_\_.



- A. 0.89A, 0.34A
- B. 0.9A, 0.4A
- C. 1A, 1A
- D. 0.6A, 0.5A

20. Calculate the potential difference between x and y.



- A. -4.527V
- B. -4.275V
- C. 4.527V
- D. 4.275V

**Turn Over**

**Section B: (40 Marks)**

Attempt ALL questions

21. Define the following basic units as applied in electrical principles. ( 4marks)
- i) Charge
  - ii) Work
  - iii) Power
  - iv) Potential difference
22. Convert the following as indicated. ( 4marks)
- i)  $0.32\text{mA} = \dots\dots\dots\mu\text{A}$
  - ii)  $3\text{MHz} = \dots\dots\dots\text{kHz}$
  - iii)  $1\text{nF} = \dots\dots\dots\text{pF}$
  - iv)  $0.03\mu\text{F} = \dots\dots\dots\text{pF}$
23. An electric heater consumes 1.8MJ when connected to a 250Vsupply for 30 minutes. Determine the; ( 4marks)
- i) power rating of the heater
  - ii) current taken from the supply
24. i) State Ohms' law (2marks)
- ii) The current flowing through a resistor is 4Awith a voltage of 60V. Determine the resistance. (2marks)
25. Draw the symbols for the following components used when drawing electrical circuit diagrams.
- i) Conductor
  - ii) Two conductors crossing but not touching
  - iii) Two conductors joined together
  - iv) Fuse
26. State the instruments used to measure the following components (4 marks)
- i) Resistance
  - ii) Current
  - iii) Potential difference
  - iv) Direct current

27. Outline **four** factors that can affect the conductor resistance (4marks)
28. i) State Kirchoff's current law. (2marks)
- ii) Define Static electricity. (2marks)
29. Differentiate between alternating current and direct current. (4 marks)
30. Outline **four** importance of earthing. (4 marks)

*easyvet.com*

***Turn Over***

**Section C (40 Marks)**

*Answer any two questions*

31. a) Describe the following methods of earthing. (8 marks)
- i) Conventional earthing
  - ii) Maintenance free earthing
- b) Describe four methods of conventional earthing. (12 marks)
32. a ) Determine the magnitude of the electric field produced by a  $1.0\text{-}\mu\text{C}$  point charge at a distance of 0.75 m. (4 marks)
- b) i) Explain **four** methods of testing earth ground resistance (8 marks)
- ii) Describe any **four** types of capacitors. (8 marks)
33. a) Describe working principle of a fuse (5 marks)
- b) i) List **three** effects of electric current (3 marks)
- ii) When two objects are rubbed with each other, approximately a charge of 50 nC can be produced in each object. Calculate the number of electrons that must be transferred to produce this charge. (5marks)
- c) i) outline **four** properties of charges (4marks)
- ii) Explain the concept of electronic