# UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, NOV/DEC 2018

COURSE NO : **EL 171**
COURSE NAME: **ELECTRICAL ENGINEERING DRAWING**
CLASS : **EL I** TIME: **2.5 HOURS**

## ANSWER ALL QUESTIONS

## SECTION A

**ANSWER *TRUE* OR *FALSE from 1 to 40 and A, B, C or D from 41 to 60 in your answer booklet. Half mark will be deducted for every wrong answer given from 1 to 40.*** You will be instructed as to how to arrange the numbering of your answers in your answer booklets. The question paper in **Section A** must be tied loosely ***into*** the answer booklet and therefore not leaving the Exams Room.

**(30 marks)**

**1.** A circuit diagram shows the actual wire connections being used in the interconnection of the components and devices.

**2.** Circuit diagrams are used for the design, construction and maintenance of electrical and electronic equipment.

**3.** In circuit diagram analysis, it is important not to concentrate on the connections but focus on the actual positions of the components.

**4.** A tree diagram/structure diagram is a graphical representation of the separation of broad information into decreasing levels of detail.

**5.** The tree diagram can be used as an analysis tool for breaking down a broad or top-level goal of a team into many levels of increasingly detailed and specific actions.

**6.** The mesh tree diagram can be used in computer networks as well as communications network illustrations.

**7.** An assembly drawing is a diagram, picture or technical drawing of an object that shows the relationship or order of assembly of various parts.

**8.** An exploded view drawing is a type of drawing that shows the intended assembly of chemical or other parts.

**9.** The arrangement in a circuit diagram of the components interconnections on the diagram does not correspond to their physical locations in the finished device.

**10.** A circuit diagram shows the theoretical position of components, while layout diagrams show pictorially how the components in the circuit diagram are actually laid out.

**11.** The position of components in the layout diagram bears a resemblance to their actual physical position.

**12.** Aluminium conductors are ordinarily used for interior electrical power distribution.

**13.** The size of each conductor in an interior electrical power distribution depends on the current rating of the circuit in which it is used.

**14.** Power distribution starts from feeder lines, through branch circuits, to protective equipment inside a building.

**15.** It is not necessary to ground the power distribution system at the service location.

**16.** Power distribution panels are rated according to the amount of electrical energy they will distribute to a building.

**17.** All equipment at the Consumers Supply Point must be enclosed and not readily accessible and must be capable of being operated without causing danger.

**18.** Isolation can be achieved by a linked switch which opens or closes all conductors simultaneously.

**19.** Larger consumers with loads of up to 300-500 kVA may not require a supply direct from a local substation.

**20.** In drawing electrical plans, most architects, designers and electrical engineers use symbols approved by standard institution boards like the American National Standards Institute only.

**21.** The block diagram is typically used for a higher level, more detailed description aimed more at understanding the overall concepts and less at understanding the details of implementation.

**22.** A schematic diagram and layout diagram used in the electrical engineering world, shows the details of each electrical component and the layout diagram shows the details of electrical construction.

**23.** In electrical engineering, a design will often begin as a very high level block diagram which helps to give a general overview of what the entire design is about.

**24.** The single-line diagram is the blueprint for electrical system analysis.

**25.** In power engineering, a one-line diagram or single-line diagram is a simplified notation for representing a one-phase power system.

**26.** An effective single-line diagram will clearly show how the main components of the mechanical system are connected, including redundant equipment and available spares.

**27.** The single-line diagram provides the roadmap to enable proper design of equipment, redundancy, and protection.

**28.** The single-line diagram serves as a vital roadmap for all future testing, servicing and maintenance activities.

**29.** An effective single-line diagram will not clearly show how the main components of the electrical system are connected, including redundant equipment and available spares.

**30.** An exploded view drawing or ‘assembly drawing’ is a diagram, picture or technical drawing of an object that shows the relationship or order of assembly of various parts.

**31.** A circuit diagram is useful when testing a circuit and for understanding how it works.

**32.** Developing functional flow block diagrams requires a decomposition tree or conception or breakdown of the various activities to be performed.

**33.** The next stage after developing is planning.

**34.** The first stage of planning involves drawing the component that has to be drawn.

**35.** No attempt is made to show the components used within a block diagram, only the inputs and outputs are shown.

**36.** The NEC defines a device as "a unit of an electrical system which is intended to carry but utilise electric energy".

**37.** The purpose of a drawing to a greater extent determines the type of drawing.

**38.** Standardisation must be considered only during the development process.

**39.** The purpose of the NEC code is to provide information considered necessary for the safeguarding of people and property against electrical hazards.

**40.** Elements on the single-line diagram do represent the physical size or location of the electrical equipment.

**CHOOSE WHICH DOES NOT BELONG BY INDICATING YOUR ANSWER AS A, B, C or D**

| | | | | |
|---|---|---|---|---|
| **41.** | A. | Fundamental Activities | B. | Standardisation |
| | C. | Developing | D. | Planning |
| **42.** | A. | Pictorial Diagram | B. | Exploded Diagram |
| | C. | Circuit Diagram | D. | Drawing Diagram |
| **43.** | A. | Name of Designer | B. | Title Block |
| | C. | Scale | D. | Date Designed |
| **44.** | A. | Short Circuit Calculations | B. | Single Line Calculations |
| | C. | Load Flow Studies | D | Safety Evaluation Studies |
| **45.** | A. | Organisational Charts | B. | Network Diagram |
| | C. | Hierarchical Diagram | D. | Tree Diagram |
| **46.** | A. | Switch | B. | Switchgear |
| | C. | Contactor | D. | Isolator |
| **47.** | A. | Start/Stop | B. | Decision Point |
| | C. | Activity | D. | Flow |
| **48.** | A. | Feeder Line | B. | Protective Equipment |
| | C. | Power Distribution System | D. | Branch Circuit |
| **49.** | A. | Aerial | B. | Audio Amplifier System |
| | C. | Tuner | D. | Detector |
| **50.** | A. | Tuner | B. | Detector |
| | C. | Loudspeaker | D. | Radio Receiver |
| **51.** | A. | Rectifier | B. | Transformer |
| | C. | Smoothing | D. | Power Supply |
| **52.** | A. | Circuit Breakers | B. | Electrical Elements |
| | C. | Capacitors | D. | Transformer |

**53.** A. Bus Bar B. Conductor
C. Capacitors D. Electrical Network

**54.** A. Load Flow Studies B. Safety Evaluation Studies
C. Single Line Studies D Efficient Maintenance

**55.** A. Function Block B. Functional Reference
C. Flow Connection D Functional Flow Block Diagram

**56.** A. Electrical Safety Procedures B. Fault Location Identification
C. Single Line Evaluation D. Short Circuit Calculation

**57.** A. Planning B. Development
C. Standardisation D. Planning and Development

**58.** A. One-line Diagram B. Three-phase Diagram
C. Power System Diagram D. Single-line Diagram

**59.** A. One-line Diagram B. Coordination Studies
C. Short Circuit Calculations D. Load Flow Studies

**60.** A. Hardware Design B. Software Design
C. Block Diagram D. Process Flow Diagram

## *SECTION B*

***Answer both questions in this section***

### *QUESTION 1*

i) Prior to drawing, three steps must be considered namely: planning, developing and standardisation. State your understanding of each of them.
ii) What is the BSI Group?
iii) NEC is the National Electrical Code. What is the purpose for the code and state the code?
iv) What is a device as defined by NEC.
v) What is ANSI?
vi) Name four block diagram rules that must be noted in drawing them?
vii) What is a functional flow block and what does it show or depicts?
viii) State what a single-line diagram is and in your own words explain the concept.
ix) In your own words, define an exploded diagram and give an overview of the diagram.
x) Discuss three things to remember about all electrical circuits when reading electrical diagrams.

(3 marks each)

**(Total = 30 marks)**

### *QUESTION 2*

**a)** i) What is the relationship between a Block Diagram, Schematic Diagram and a Layout Diagram. (5 marks)

Distinguish between a layout diagram and a schematic diagram. (3 marks)

ii) List three (3) tips necessary to produce best results in circuit diagram drawings. (3 marks)

iii) There are three essential features of every supply point as required by regulations. Name all three. (6 marks)

iv) Discuss your understanding of the following:

a) Switch;
b) Circuit Breaker;
c) Contactor; and
d) Isolator. (8 marks)

v) In four steps, state what a flowchart can help you to know? (4 marks)

vi) State three (3) advantages and disadvantages of using flowcharts. (3 marks)

**b)** i) Draw any block diagram that you can think of with three levels of details and label it appropriately. (4 marks)

ii) Draw a tree diagram that you can think of with three levels of details and label it appropriately. (4 marks)

**(Total = 40 marks)**

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