# THE UNITED REPULIC OF TANZANIA
# NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
# DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

**794** **ELECTRICAL INSTALLATION (SUPPLEMENTARY)**

**Time: 3 Hours** **Year: 2020**

## Instructions

1. This paper consists of sections A and B with a total of **fifteen (15)** questions.
2. Answer **all** questions in section A and **three (3)** questions from section B.
3. Section A carries **forty (40)** marks and section B carries **sixty (60)** marks.
4. Non programmable calculators may be used.
5. All communication devices and any unauthorised materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).








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## SECTION A (40 Marks)

Answer **all** questions in this section.

1. What four factors that can cause someone not to adopt non-metallic conduits over steel conduits type of wiring system?

2. Why is it necessary to carry out the following tests on a newly completed installation?
   (a) Earth loop impedance test.
   (b) Verification of polarity test.
   (c) Ring circuit continuity test.
   (d) Earth electrode resistance test.

3. Give two differences between Lump sum and Firm price as used in cost estimation.

4. What are the four safety regulations for floor and surface in the workshop?

5. Suppose you have been employed as an electrician in a certain company; How would you use the following hand tools in your works:
   (a) Hacksaw
   (b) Screw driver
   (c) Pliers
   (d) Centre punch

6. Draw a schematic diagram of two bells located at different places controlled by one push button.

7. You are required to join two conductors by soldering and you have to make a crimped termination. Mention four tests which should be carried out to make sure that you end up with good result.

8. State four measures that should be taken to ensure that 3-phase induction motor operates for a longer time without failure.

9. (a) Differentiate standing cost from running cost as used in generation of electric power.
   (b) Give two examples of standing costs and two examples of running costs incurred by power Supply Company.

10. (a) Why silver is the mostly preferred material for fusing element?
    (b) What is the minimum fusing current of a rewireable fuse which is rated at 30A with a fusing factor of 4?



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## SECTION B (60 Marks)

Answer **three (3)** questions from this section.

11. (a) What could be the cause of sparks at the following parts of D.C. machines?
    (i) Brushes
    (ii) Commutator
    (iii) Armature

    (b) A D.C. shunt machine when runsat 1000 r.p.m. as a motor on no load have an iron and friction losses of 219.5 W. The field current and armature resistance are 1A and 0.5 Ω respectively. Calculate the efficiency of the machine when running as a generator delivering 40A at 220V.

12. (a) What are the three conditions which must be fulfilled for parallel operation of alternators?

    (b) A 3000 kVA, 6 poles alternator runs at 1000 r.p.m. in parallel with other machines on 3,300V bus-bars. If the synchronous reactance is 25%; calculate the synchronizing power for one mechanical degree of displacement and the corresponding synchronizing torque.

13. (a) What are the three means of protection that switchgear should be provided with?

    (b) Account for the six points to be considered during installation of domestic ring circuit.

    (c) Figure 1 shows the circuit diagram for a certain lighting control system. Study the circuit carefully and then answer the questions that follow:

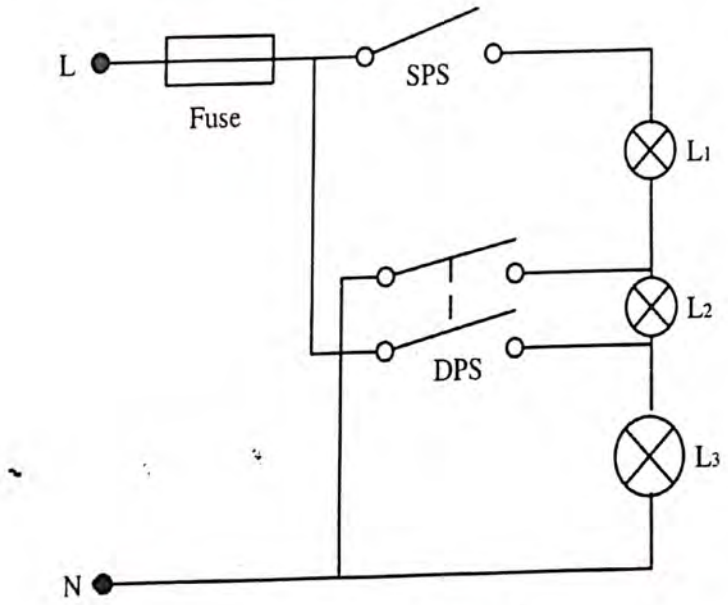



**Figure 1**

(i) State all four conditions obtained in operation of SPS and DPS and their effect on lamps $L_1$, $L_2$ and $L_3$.
(ii) Where do the SPS and DPS used for their normal operation?
(iii) Give the current ratings of SPS and DPS.



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14. (a) Why is it necessary to incorporate armouring in an underground cable?

(b) Underground system of an electric power transmission is better compared to overhead system. Justify the statement by giving six reasons.

(c) A 2-core copper cable supplies current to a 240V single phase load of 18 kW at 0.78 power factor. The cable is 40m long and each conductor has a cross sectional area of 35 $mm^2$. Calculate the:

(i) voltage drop in the cable at load, ignoring the reactance of the cable.

(ii) power lost in the cable (Take resistivity of copper as 17.5 $\mu\Omega$mm).

15. (a) With the aid of circuit diagram, explain how does open circuit test is done in a transformer?

(b) If no load test is done on a single phase transformer 220V/110V; the following data is obtained: primary current is 0.5A and power input is 30W. Find:

(i) Turns ratio.

(ii) Magnetizing current of no load.

(iii) Primary copper losses if primary resistance is 0.6$\Omega$

(iv) Iron losses if copper loss is neglected and if copper loss is not neglected.

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