UNIVERSITY OF TECHNOLOGY, JAMAICA

FACULTY: ENGINEERING & COMPUTING

SCHOOL: ENGINEERING

Final Examination, Semester 2

Module Name: Electrical Workshop

Module Code: ELE- 1003

Date: April – May, 2010

Theory/ Practical: Theory

Groups: ENG. 1

Duration: Two (2) hours

Instructions

1. Write clearly
2. Answer any four (4) questions
3. All diagrams must be drawn with pencil

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QUESTION NO. 1

(a) Define the terms ‘dead’ and ‘earth’ as applied to electrical installations.

(b) What factors must be considered when selecting cables/conductors for a particular task?

(c) Make a neat cross-section sketch of a piece of 3-core PVCSWA cable, Identify and explain the function of the main parts.

(d) Using suitable diagrams explain how you would carry out a polarity test on the lighting circuit of figure 1, giving typical values you would expect for a good result.

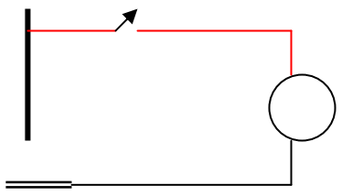

Fig.1 – Lamp control by single switch

(4, 6, 5, 10)

QUESTION NO. 2

(a) A distribution system is fed from both ends as shown in Fig.2. Given that the line resistances send and return, is 0.0025Ω per metre and currents and distances as shown.

Determine i) The magnitude and direction of current in each source.
ii) The current in each section of the line.

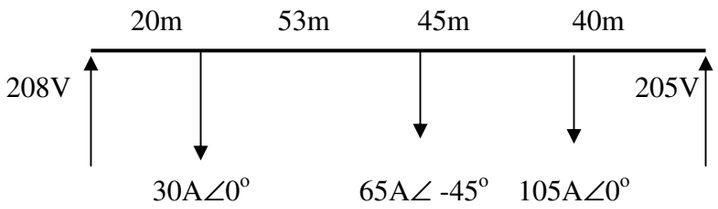

Fig.2

(b) The colour code on a resistor is Black, Yellow, Green and Gold. Estimate its value using the colour code and show how this value can be checked by the Voltmeter -Ammeter method.

(20, 5)

QUESTION NO.3

(a) Given that a moving coil ammeter has an internal resistance of 0.315Ω and a full scale deflection of 32mA, determine the value of resistance needed to convert the instrument to measure:

- 100A dc
- 150V dc

Draw suitable wiring diagrams in each case.

(b) You are required to connect a 30Hp, 3∅, 440V, 50Hz induction motor to a source of supply. If the motor is located 10m from the source, and assuming a starting current of two times running current, determine the minimum size of cable and circuit breaker for this installation.

(c) List four advantages and three disadvantages of underground distribution systems

(10, 8, 7)

QUESTION NO.4

(a) With the aid of a suitable diagram, explain the principle of operation of an incandescent lamp. What is the advantage of this lamp over the fluorescent lamp?

(b) An industrial load consists of the following:-

2--- 10Hp, 440V, 3∅ induction motor
1--- 10KW, 415V DC motor
2--- 220V, 15KW Electric heaters
6--- 220V, 250W Sodium Lamps
1--- 220V, 5KW General Load

Draw a detail wiring diagram of the installation
Assuming a distance of 15m, from the point of entry to the main panel, use the table provided to select suitable conductors for the main. Show all necessary calculations.

(10, 15)

QUESTION NO. 5

(a) Using neat diagrams show how you can use a VOM to test a 110V /12V, 60W, 50Hz transformer. State the results expected for a good transformer.

(b) Design a full-wave rectifier to supply 12Vdc / 60W from a 110V supply, identifying all the components used giving their function and specification.

(c) Explain using the human body as a resistance, the importance of earthing all metals that are not current carrying conductors in an installation.

(8, 10, 7)

QUESTION NO. 6

(a) State and explain the Electrical regulations for the following:-

- Detached buildings
- Connection of switches and control devices
- Control of supply to consumer's installation

(b) Prepare a detail material list for the light circuit shown in Fig.3 if the system is to be wired flush using pvc conduit.

(c) Draw a detail wiring diagram from the point of entry for the outlet circuits shown in Fig.3

(10, 10, 5)

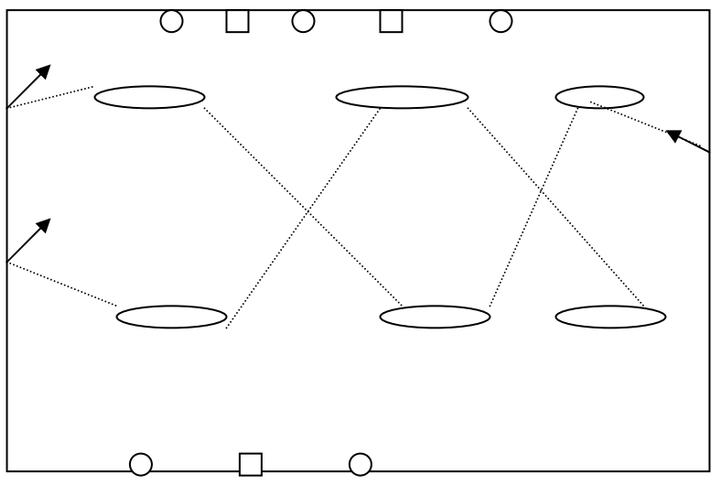

Figure 3 – Layout of installation

Key

220v / 40W twin Fluorescent

110V / 5A outlets

220V / 15A outlets

End of Examination