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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2014/2015**

COURSE NAME : ELECTRICAL TECHNOLOGY
COURSE CODE : BNB 30403
PROGRAMME : BNB
EXAMINATION DATE : DECEMBER 2014/JANUARY 2015
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES

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- Q1**
- (a) Describe **THREE (3)** general categories of the transformer core materials. (6 marks)
- (b) A certain type of transformer has a primary resistance of 960Ω and a primary current of 5A. The secondary current is 90A and the secondary voltage is 240V. Determine the efficiency of this transformer. (4 marks)
- (c) The resistance in the primary of a transformer is $R_{pri} = V_{pri}/I_{pri}$ while the resistance in the secondary is $R_L = V_{sec}/I_{sec}$. Knowing that $V_{sec}/V_{pri} = n$ and $I_{pri}/I_{sec} = n$. Derive the formula for turn ratio, n in term of R_{pri} and R_L , by using these relationships. (10 marks)

- Q2**
- (a) State **THREE (3)** types of losses in transformers and explain the methods to minimize it. (6 marks)
- (b) A 20kVA 8000/480V distribution transformer has the following resistances and reactances:

$$\begin{array}{ll} R_P = 32 \Omega & R_S = 0.05 \Omega \\ X_P = 45 \Omega & X_S = 0.06 \Omega \\ R_C = 250 \text{ k } \Omega & X_M = 30 \text{ k } \Omega \end{array}$$

The excitation branch impedances are given referred to the high-voltage side of the transformer.

- (i) Determine the equivalent circuit of this transformer referred to the high-voltage side. (3 marks)
- (ii) Determine the per-unit equivalent circuit of this transformer. (4 marks)
- (iii) Assume that this transformer is supplying rated load at 480 V and 0.8 PF lagging. Determine the input voltage and voltage regulation. (4 marks)
- (iv) Calculate the efficiency of the transformer under the conditions of part (iii). (3 marks)

- Q3**
- (a) In ac power system consist single and three phase circuit. Briefly discuss advantages and disadvantages of a single phase and three phase ac system. (9 marks)
- (b) In ac system, define:
- (i) Apparent power (VA) (2 marks)
- (ii) Reactive Power (VAR) (2 marks)
- (c) A balanced Y - connected load by a balanced, positive sequence Δ - connected source with a line voltage of 210V, calculate:
- (i) Load impedance (2 marks)
- (ii) Phase voltage (2 marks)
- (iii) Phase current (3 marks)
- Q4**
- (a) Nowadays, three-phase electrical system become more important to human life. It also a common method of alternating-current electric power generation, transmission, and distribution. Explain the reasons that make three phase system so important. (6 marks)
- (b) State **FOUR (4)** possible connection for three phase system. (4 marks)
- (c) Refer to the circuit in Figure **Q4(c)**. At the source and at the load, determine:
- (i) The total average power (2 marks)
- (ii) The reactive power (2 marks)

(iii) Name of the circuit connection. (2 marks)

(iv) Discuss why these type of connection also known as the key to solving all balanced three-phase systems. (4 marks)

Q5 (a) State various types of wiring system commonly used and explain any **ONE (1)** of them in details. (4 marks)

(b) List the accessories used in an electrical installation. (4 marks)

(c) Describe the simple control circuit used in domestic installations with the illustration of the circuit diagram, (4 marks)

(c) Differentiate between lighting and power sub-circuit. (8 marks)

- END OF QUESTION -

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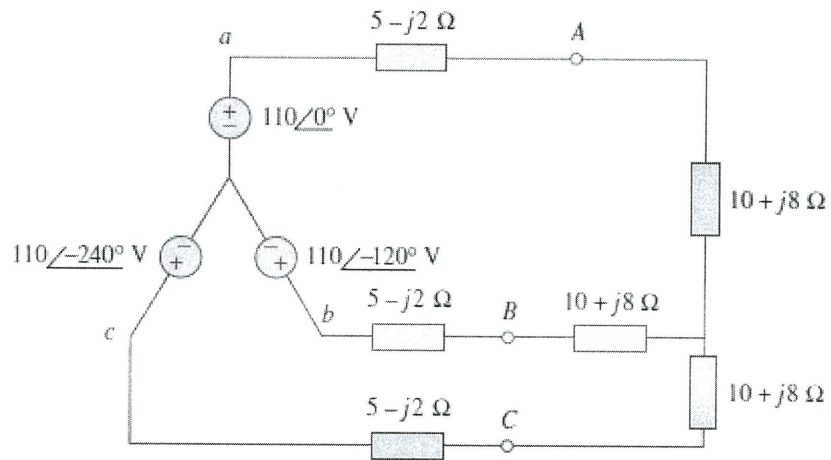


Figure Q4(c)