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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

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

COURSE NAME : ELECTRICAL & ELECTRONIC
TECHNOLOGY

COURSE CODE : BNJ10903

PROGRAMME : 1BNH / 1BNK

EXAMINATION DATE : JUNE 2015 / JULY 2015

DURATION : 3 HOURS

INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

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- Q1** (a) Explain in detail **TWO (2)** types of losses in magnetic circuit. (6 marks)
- (b) An electromagnet is shown in **FIGURE Q1(a)** whose area of cross-section of core is 12 cm^2 . Mean length of iron path is 50 cm. It is excited by two coils each having 400 turns. When the current turn the coils is 1.0 A, the resulting flux density gives a relative permeability of 1300.
- Calculate:
- (i) Reluctance of iron part of the magnetic circuit (3 marks)
 - (ii) Reluctance of the air gap (3 marks)
 - (iii) Total reluctance (2 marks)
 - (iv) Total flux (3 marks)
 - (v) Flux density in the air gap. Neglect leakage and fringing (3 marks)
- Q2** (a) Based on the circuit in **FIGURE Q2(a)**:
- (i) Convert the circuit to the phasor domain equivalent circuit. (3 marks)
 - (ii) Find the input impedance. (2 marks)
 - (iii) Determine $V_o(t)$ (3 marks)
- (b) The voltage across a load is $v(t) = 60 \cos(\omega t - 10^\circ) \text{ V}$ and the current through the element in the direction of the voltage drop is $i(t) = 1.5 \cos(\omega t - 50^\circ) \text{ A}$.

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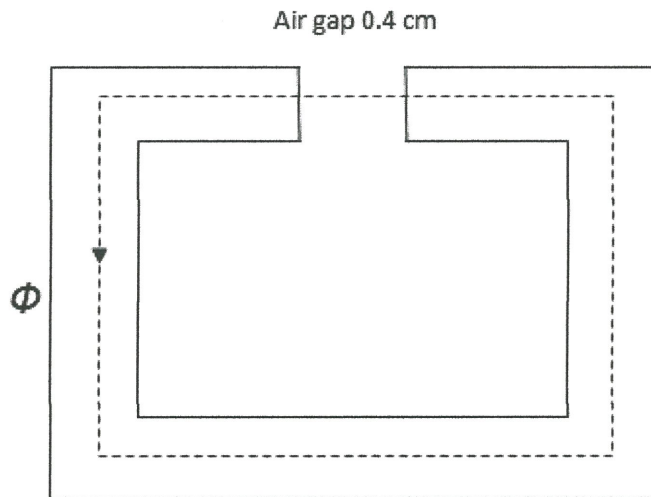


FIGURE Q1(a)

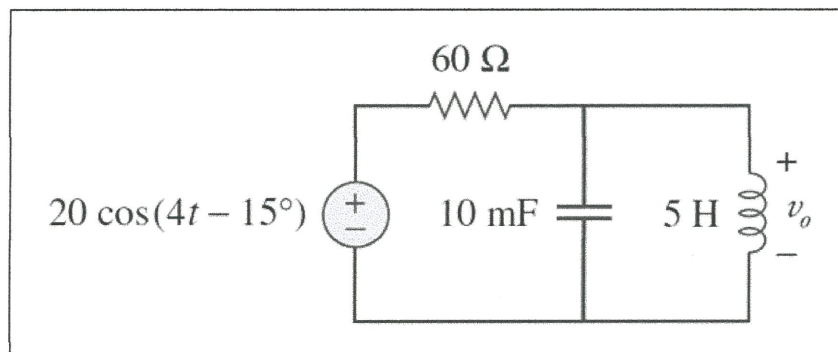


FIGURE Q2(a)

Determine

- (i) The complex and apparent powers (3 marks)
 - (ii) The real and reactive powers (3 marks)
 - (iii) The power factor and the load impedance. (3 marks)
- (c) Explain the advantages of Alternating Current (AC) over Direct Current (DC) (3 marks)

- Q3**
- (a) Sketch the typical voltage/current characteristics for a rectifier diode and a zener diode. (3 marks)
 - (b) Describe with illustration how each of the sensor listed below operates:
 - (i) Thermocouple (2 marks)
 - (ii) Strain Gauge (2 marks)
 - (c) Knowing that $R_{pri} = \left(\frac{1}{n}\right)^2 R_L$. Derive the formula for turn ratio, n in term of R_{pri} and R_L , by using these relationships. (4marks)
 - (d) Determine the possible inputs to give an output of logic 1 from the logic circuit shown in **FIGURE Q3(a)**. (4 marks)
 - (e) Simplify the Boolean expression $F(xyz) = x'y'z' + xy'z' + x'yz' + xyz'$ using K- map method. (5 marks)

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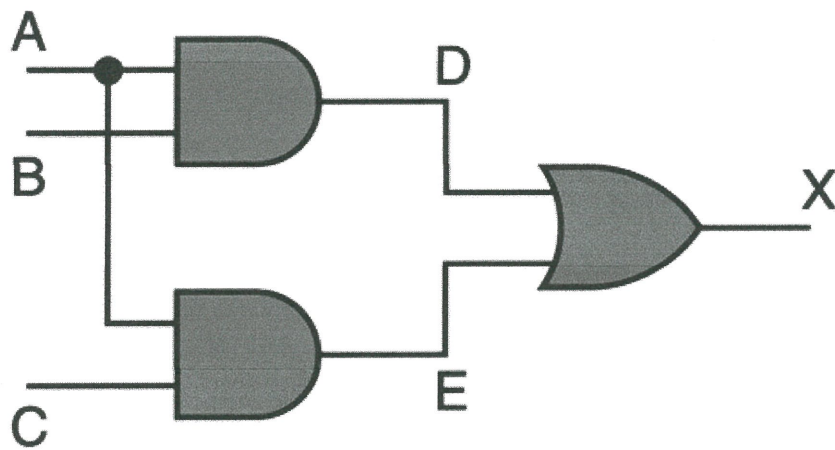


FIGURE Q3(a)

- Q4** (a) In AC motor consist single and three phase AC motor type. Briefly discuss the operation of three phase AC motor with illutration and state disadvantages of three phase AC motor over single phase AC motor. (9 marks)
- (b) A 50-hp, 250-V, 1200 r/min dc shunt motor with compensating windings has an armature resistance (including the brushes, compensating windings, and interpoles) of 0.06 n. Its field circuit has a total resistance $R_{adj} + R_F$ of 50 Ω , which produces a *noload* speed of 1200 r/min. There are 1200r/min per pole on the shunt field winding.
- (i) Draw the equivalent circuit for the three phase AC motor above. (3 marks)
- (ii) Determine the speed of this motor when its input current is 100 A and 200 A. (5 marks)
- (iii) Plot the torque-speed characteristic of this motor. (3 marks)
- Q5** (a) State various types of wiring system commanly 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 OFQUESTION -