



UTHM

Universiti Tun Hussein Onn Malaysia

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION (ONLINE) SEMESTER I SESSION 2020/2021

COURSE NAME : ELECTRICAL TECHNOLOGY
COURSE CODE : DAE 11003
PROGRAMME CODE : DAE
EXAMINATION DATE : JANUARY / FEBRUARY 2021
DURATION : 3 HOURS
INSTRUCTION : ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **EIGHT (8)** PAGES

TERBUKA
CONFIDENTIAL

- Q1**
- (a) Define **Ohm's Law** with the aid of a definitive formula. (3 marks)
- (b) Identify **two (2)** types of variable resistor and state their functions. (4 marks)
- (c) Determine the minimum and maximum resistance values in accordance to the following color band: (6 marks)
- (i) White, blue, black, silver.
(ii) Orange, yellow, violet, gold.
- (d) 102.32×10^{10} electrons flow through a wire in 500 ms. Calculate the current in amperes. (4 marks)
- (e) If the input power is 554 W and the output power is 443 W, evaluate how much power is lost and the efficiency of this power supply. (3 marks)
- (f) Design a switch (*Double Pole Double Through – DPDT*) arrangement whereby two voltage sources (V_{S1} and V_{S2}) can be connected simultaneously to either of two resistors (R_1 and R_2) as follows: (5 marks)
- i) V_{S1} connected to R_1 and V_{S2} connected to R_2 or
ii) V_{S1} connected to R_2 and V_{S2} connected to R_1
- Q2**
- (a) State **three (3)** formulas for power in electric circuit. (3 marks)
- (b) Define what is power rating in a resistor. (2 marks)
- (c) Convert the following: (2 marks)
- (i) 2873.51 W to milliwatts
(ii) 3469.87 μ W to watts
- (d) A certain resistor has the following color code: blue, green, yellow, silver. Determine the maximum and minimum currents that can be obtained when 24 V source is connected across the resistor. (7 marks)
- (e) By varying the rheostat in **Figure Q2(e)**, you obtained the amount of current of 7423.65 μ A. Calculate the resistance value for this setting. (3 Marks)

TERBUKA**CONFIDENTIAL**

(f) **Five (5) 3624 Ω resistors** are connected in series with a 330 V source. Calculate current in the circuit. (3 Marks)

(g) Construct a schematic diagram as below:
 R_1 in parallel with a branch containing R_2 in series with a parallel combination of R_3, R_4, R_5 and R_6 . (5 marks)

Q3. (a) Define what **Kirchhoff's Current Law** is (2 marks)

(b) Differentiate between opened and closed circuit. (3 marks)

(c) Determine V_{R1}, R_2 and R_3 in referring to **Figure Q3(c)**. (6 marks)

(d) Referring to **Figure Q3 (d)**:
 (i) Calculate the total current from the power supply (I_T). (6 marks)

(ii) Determine current through each resistor (I_2, I_3, I_4, I_5, I_6) (6 marks)

(iii) Determine the voltage at node A with respect to ground. (2 marks)

Q4. (a) Define the magnetic flux density with the aid of a definitive formula (2 marks)

(b) The current flowing through 20 turns of wire is 10 A. Determine the following:

(i) Magnetomotive force (m.m.f) (2 marks)

(ii) Reluctance of the circuit if the flux is 789 μWb. (3 marks)

(c) By referring to **Figure Q4 (c)**, determine the following:

(i) Flux density in the core. (3 marks)

TERBUKA
CONFIDENTIAL

- (ii) Show the north and south poles of the magnet. (2 marks)
 - (d) Calculate the flux in a magnetic material when the flux density is $2500 \times 10^{-6} \text{ T}$ and the cross-sectional area is 150 cm^2 . (7 marks)
 - (e) Construct a basic **three (3)** step ladder network (6 marks)
- Q5.**
- (a) (i) Define frequency. (1 mark)
 - (ii) Illustrate 4 Hz sine wave frequency. (2 marks)
 - (b) Convert the following angular values from degrees to radians:
 - (i) 135° (2 marks)
 - (ii) 300° (2 marks)
 - (c) A sinusoidal current has an rms value of 5mA. Determine the following values:
 - (i) I_p (2 marks)
 - (ii) I_{avg} (of half cycle) (2 marks)
 - (iii) I_{pp} (2 marks)
 - (d) Solve the following operations:
 - (i) $(15 - j10) \times (-25 - j30)$ (3 marks)
 - (ii) $\frac{(250 \angle 90^\circ + 175 \angle 75^\circ)(50 - j100)}{(125 + j90)(35 \angle 50^\circ)}$ (4 marks)
 - (e) Design a simple AC generator complete with magnetic poles, anchor, load, carbon brushes and slip rings. (5 marks)

- Q6** (a) Define turns ratio in transformer. (2 marks)
- (b) Identify **three (3)** advantages and **two (2)** disadvantages of DC motor (5 marks)
- (c) Determine the following quantities referring to **Figure Q6(c)**.
- (i) Primary current (2 marks)
- (ii) Secondary current (2 marks)
- (iii) Secondary voltage (2 marks)
- (iv) Power in the load (2 marks)
- (d) Identify the parts labelled as i, ii, iii, iv and v of a DC machines referring to **Figure Q6(d)**. (5 marks)
- (e) Construct:
- (i) Separately excited dc generator circuit.
- (ii) Shunt wound dc motor circuit. (5 marks)

-END OF QUESTIONS –

TERBUKA

FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 2020/2021
COURSE NAME : ELECTRICAL TECHNOLOGY

PROGRAMME CODE : DAE
COURSE CODE : DAE 11003

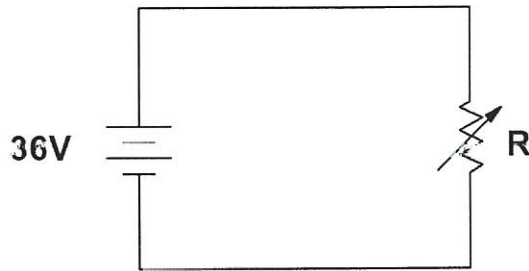


Figure Q2 (e)

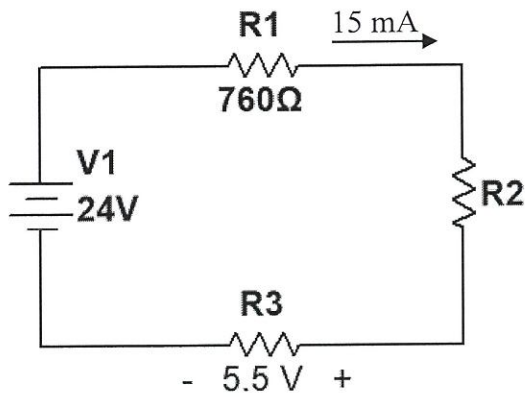


Figure Q3 (c)

TERBUKA

FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 2020/2021
COURSE NAME : ELECTRICAL TECHNOLOGY

PROGRAMME CODE : DAE
COURSE CODE : DAE 11003

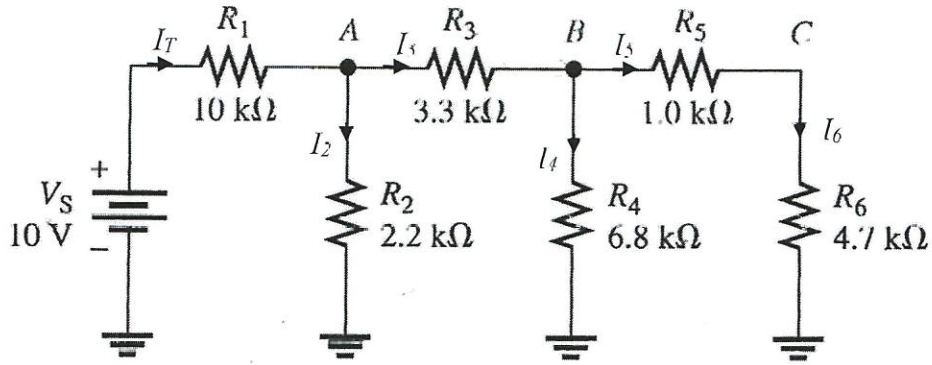


Figure Q3 (d)

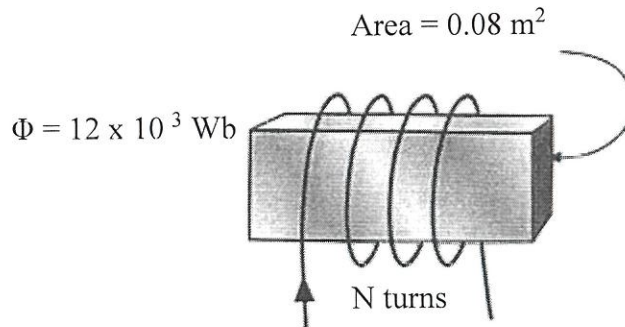


Figure Q4 (c)

TERBUKA

FINAL EXAMINATION

SEMESTER / SESSION : SEM I / 2020/2021
COURSE NAME : ELECTRICAL TECHNOLOGY

PROGRAMME CODE : DAE
COURSE CODE : DAE 11003

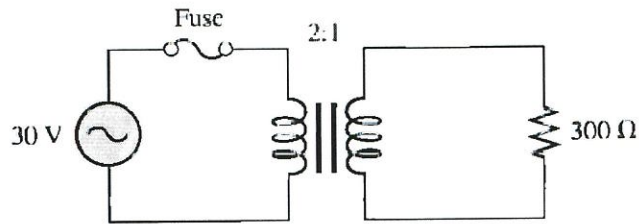


Figure Q6 (c)

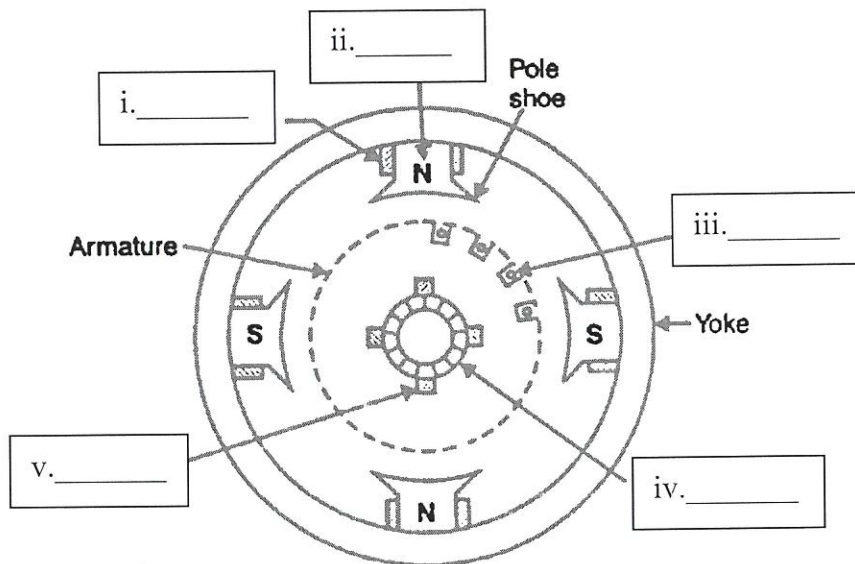


Figure Q6 (d)

TERBUKA