

POLITEKNIK
Jabatan Pengajian Politeknik

EXAMINATION AND EVALUATION DIVISION
DEPARTMENT OF POLYTECHNIC EDUCATION
(MINISTRY OF HIGHER EDUCATION)

ELECTRICAL ENGINEERING DEPARTMENT

FINAL EXAMINATION
JUNE 2012 SESSION

ET101 : ELECTRICAL TECHNOLOGY

DATE : 23rd NOVEMBER 2012 (FRIDAY)

DURATION : 2 HOURS (8.30AM – 10.30AM)

This paper consists of **TWELVE (12)** pages including the front page.

Section A1: Objective (10 questions – answer all)

Section A2 : Fill-in-the-blank (10 questions – answer all)

Section B : Structure (10 questions – answer all)

Section C : Essay (2 questions – answer all)

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THE CHIEF INVIGILATOR

(The CLO stated is for reference only)



SECTION A**OBJECTIVE QUESTIONS (20 marks)****INSTRUCTION:**

This section consists of **TWENTY (20)** objective questions.

Answer **ALL** questions in the answer booklet.

1. Convert 0.00033 to engineering notation. [CLO2:C3]
 - A. 330×10^{-6}
 - B. 3300×10^{-6}
 - C. 33×10^{-6}
 - D. 0.33×10^{-6}
2. Figure A (2) shows 4-D size batteries connected in a series circuit. What is the total voltage measured between points A and B? [CLO2:C3]

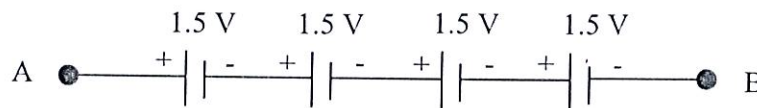


Figure A (Q2)

- A. 1.5 V.
- B. 6 V.
- C. 4 V.
- D. None of the above.

3. Two bulbs marked 200 watt-250 volts and 100 watt-250 volts are joined in series to 250 volts supply. Power consumed in circuit is _____ [CLO2:C3]
- A. 33 watt
 - B. 67 watt
 - C. 100 watt
 - D. 300 watt
4. If a circuit contains two unequal resistances in parallel, [CLO1:C1]
- A. the current is same in both.
 - B. large current flows in larger resistor.
 - C. the potential difference across each resistor is same.
 - D. smaller resistance has smaller conductance while the current is same in both.
5. Choose the correct statements related to the Maximum Power Transfer.[CLO1:C1]
- i. Number of nodes for a network must be determined.
 - ii. A supply is operating under 50% efficiency when $R_L = R_{Th}$.
 - iii. Maximum power to the load is set equal to the Norton resistance.
 - iv. A load will receive maximum power when load resistance is equals to Thevenin resistance.
- A. i and ii
 - B. i and iii
 - C. ii and iv
 - D. iii and iv

6. Which of the following equations are related to the circuit in Figure A(6) when current through R3 is calculated by using Mesh Analysis? [CLO2:C3]

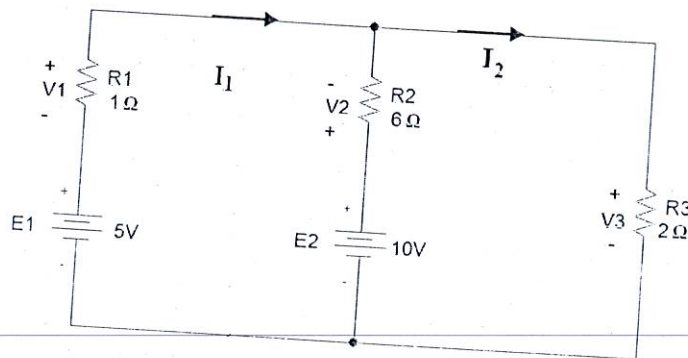


Figure A(Q6)

- i. $-E1 + V1 + V2 + E2 = 0$
 - ii. $V2 + V3 - E2 = 0$
 - iii. $7 I_1 - 6 I_2 + 10 = 0$
 - iv. $8 I_2 - 6 I_1 = 10$
- A. i, ii and iii C. i, iii and iv
 B. i, ii and iv D. ii, iii and iv
7. A $0.1 \mu\text{F}$ and $0.4 \mu\text{F}$ capacitors are in series. Calculate the total capacitance.

[CLO2:C3]

- A. $0.8 \mu\text{F}$
- B. 80 pF
- C. 8 pF
- D. $8 \mu\text{F}$

8. Determine the voltage across a 1000 pF capacitor that is storing 20 micro-coulombs ($20\mu\text{C}$) of charge. [CLO2:C3]
- A. $20\mu\text{V}$
 - B. 20kV
 - C. 0.2 kV
 - D. 2V
9. A series RL circuit has a resistance of $1\text{ k}\Omega$ and inductance of 1mH . Calculate the time constant. [CLO2:C3]
- A. $1\mu\text{s}$
 - B. 1ms
 - C. $10\mu\text{s}$
 - D. None of above
10. The ability to concentrate magnetic flux is called_____ [CLO1:C1]
- A. Permeability
 - B. Density
 - C. Magnetism
 - D. Polarization

17. _____ is the amount of capacitance when one coulomb of charge is stored with one volt across the plates. [CLO1:C1]
18. Inductance is directly proportional to the square number of _____, permeability, and the cross-sectional area of the core. [CLO1:C1]
19. Flux _____ is the number of magnetic field lines per unit area of a section perpendicular to the direction of flux. [CLO1:C1]
20. When magnetic flux moves, the motion of magnetic lines cutting across a conductor forces free electrons in the conductor to move and produce current by an action called _____. [CLO1:C1]

QUESTION 7

By using Thevenin's Theorem, find the V_{TH} through R_L for the value of 2Ω as shown in Figure B (7).

[CLO2:C3]

(3 marks)

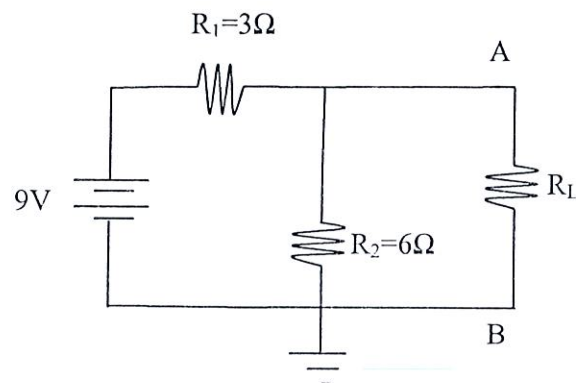


Figure B(Q7)

QUESTION 8

Define a capacitor and state its unit.

[CLO1:C1]

(2 marks)

QUESTION 9

Define Faraday's Law.

[CLO1:C1]

(2 marks)

QUESTION 10

List the **THREE (3)** ferromagnetic materials.

[CLO1:C1]

(3 marks)

SECTION C

ESSAY QUESTIONS (50 marks)

INSTRUCTION:

This section consists of **TWO (2)** essay questions.

Answer **ALL** questions.

QUESTION 1

- a) From Figure C(1a), determine the total resistance as seen from the source terminal.

[CLO2:C3]

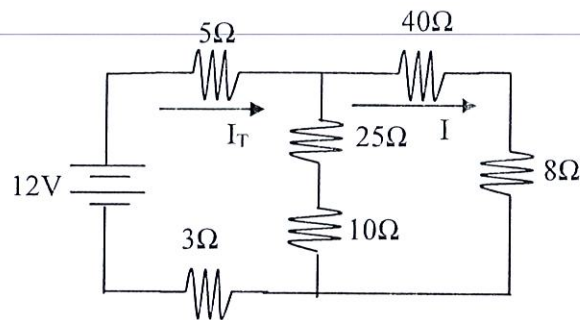


Figure C (Q1a)

(6 marks)

- b)
i. Define Norton's Theorem.

[CLO1:C2]

(3 marks)

- ii. Based on Figure C(1b), calculate the following using Norton's Theorem if $R_L = 10\Omega$ [CLO2:C3]

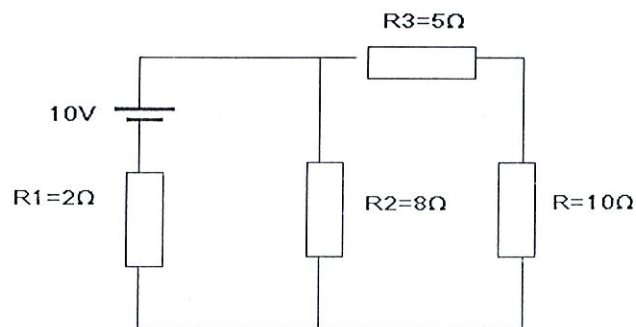


Figure C(Q1b)

- iii. With the aid of schematic, calculate the Norton current, I_N . (4 marks)
- v. The Norton Resistance, R_N . (4 marks)
- vi. Draw Norton equivalent circuit. (4 marks)
- vii. The current flows at $R_L = 10\Omega$. (4 marks)

QUESTION 2

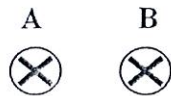
- a) Illustrate the magnetic lines of two fields for the parallel conductors in the following condition: [CLO2:C3]

i.



(2.5 marks)

ii.



(2.5 marks)

- b) By using an appropriate diagram, explain **THREE(3)** methods which are used to determine the magnetic field direction.

[CLO1:C2]

(9 marks)

- c) A closed magnetic circuit of cast steel has a sectional area of 2cm^2 . A coil of 400 turns is wound around the 5cm length of the circuit and a current of 3A flows. Calculate the flux density in the circuit if the relative permeability of the cast steel is 700.

[CLO2:C3]

(6 marks)

- d) By using an appropriate diagram, explain the Faraday's First Law.

[CLO2:C2]

(5 marks)