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# KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS  
2017/2018 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER  
SUPPLEMENTARY EXAMINATIONS

FOR THE DEGREE OF BED (SC) & BSC (PHYSICS)

**COURSE CODE:** SPH 216

**COURSE TITLE:** ELECTRONICS I

**DURATION:** 2 HOURS

**DATE:** 17/10/2018      **TIME:** 3:00-5:00PM

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## INSTRUCTIONS TO CANDIDATES

- Answer **QUESTION ONE** (Compulsory) and any other two (2) Questions.
- Indicate **answered questions** on the front cover.

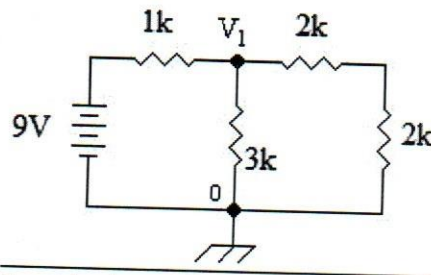
Start every question on a new page and make sure question's number is written on each page

This paper consists of 3 printed pages. Please Turn Over

KIBU observes ZERO tolerance to examination cheating

**QUESTION ONE (30mks)**

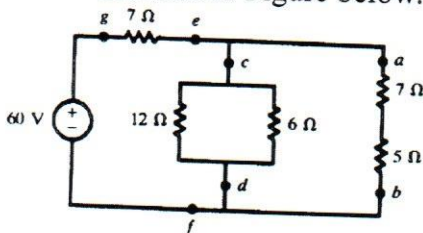
- a) State Norton Theorem (1mk)
- b) Define the term forbidden gap (2mks)
- c) State three disadvantages of Centre tapped full –wave rectifier (3mks)
- d) State two advantages of C-Filter (2mks)
- e) Copper has  $8.0 \times 10^{28}$  conduction electrons per metre cubed. A copper wire of length 1m and cross-sectional area  $8.0 \times 10^{-6} \text{ m}^2$  carrying a current and lying right angles to a magnetic field of strength  $5.0 \times 10^{-3} \text{ T}$  experiences a force of  $8.0 \times 10^{-2} \text{ N}$ . What is the drift velocity of the free electrons in the wire? (3mks)
- f) Distinguish between *ideal voltage source* and *ideal current source*. (2mks)
- g) State Kirchoff's laws (2mks)
- h) A voltage divider circuit of two resistors is designed with a total resistance of the two resistors equal to  $50.0\Omega$ . If the output voltage is 10 percent of the input voltage, obtain the values of the two resistors in the circuit. (3mks)
- i) An LED is constructed from a p-n junction based on a certain Ga-as-s semiconducting material whose energy gap is  $1.9\text{eV}$ . What is the wavelength of the emitted light? (take  $h = 6.26 \times 10^{-34} \text{ J.s}$  and speed of light,  $c = 3 \times 10^8 \text{ m/s}$ ) (3mks)
- j) Give two reasons why CE configuration is normally preferred in transistor connection. (2mks)
- k) Given the Circuit below, find the voltages at all nodes (4mks)



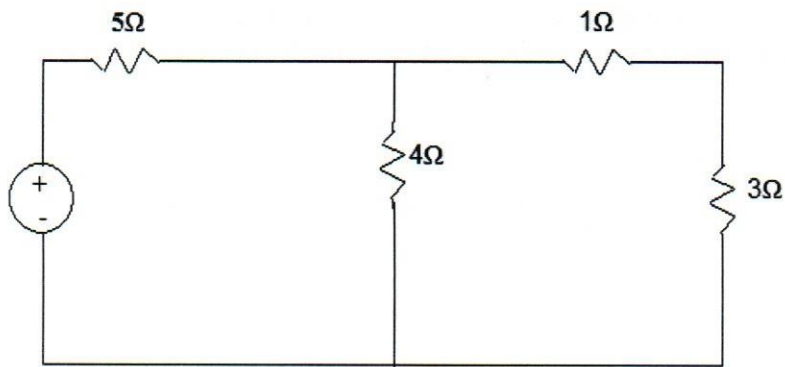
- l) Distinguish between intrinsic and extrinsic semiconductors (3mks)

**QUESTION TWO (20mks)**

- a) Obtain the total power supplied by the 60-V source and the power absorbed in each resistor in the network of Figure below. (14mks)



- b) The figure below shows a resistor network connected to a 28V d.c supply.

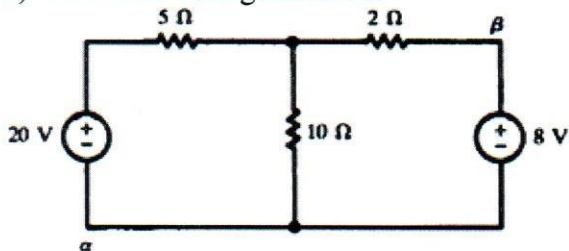


- (i) Determine the Thevenin Voltage across the  $3\Omega$  resistor. (4mks)  
 (ii). Sketch the Thevenin equivalent circuit. (2mks)

**QUESTION THREE (20mks)**

Solve the circuit below using

- i) Branch current method (7mks)  
 ii) The node voltage method. (7mks)

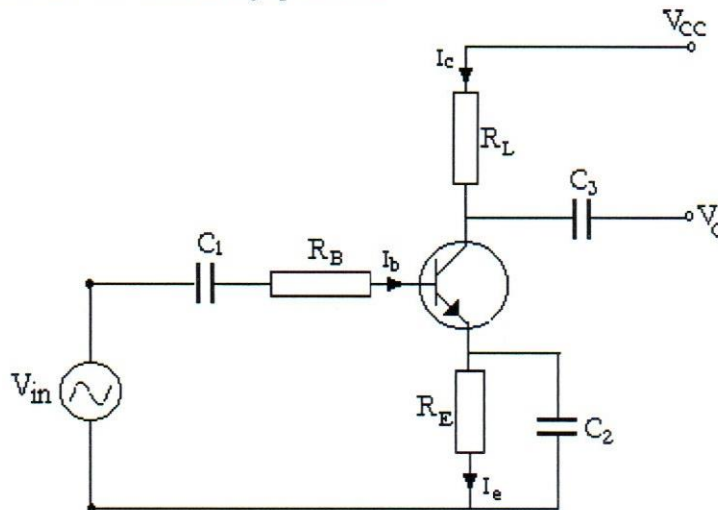


b) In a circuit,  $V_{CC} = 10\text{ V}$ ,  $R_c = 5\text{ K}$ ; do the following

- i. Draw a D.C. load line (2marks)  
 ii. Find the coordinates of Q- point at  $I_B = 10\ \mu\text{A}$  and  $\beta = 70$ . (4marks)

**QUESTION FOUR (20mks)**

Use the circuit below to answer the following questions



- a) What is the function of each of the following circuit components:  $C_1$ ,  $C_2$ ,  $C_3$ ,  $R_L$ ,  $R_B$ . (4mks)  
 b) Calculate  $I_e$ ,  $I_c$ ,  $I_b$ ,  $V_C$ ,  $V_E$  and  $V_{CE}$  if  $R_B = 1\text{ M}\Omega$ ,  $V_{BB} = 30\text{ V}$ ,  $V_{CC} = 30\text{ V}$ ,  $R_E = 10\text{ K}\Omega$ ,  $R_C = 5\text{ K}\Omega$  and  $\beta = 100$ . (6mks)

- c) Briefly explain how you would use a transistor as a switch (5marks)
- d) Describe the process of full wave rectification using a bridge circuit (5mks)

**QUESTION FIVE (20mks)**

- a) Distinguish between Avalanche breakdown and Zener breakdown (6mks)
- b) Based on Energy band theory, materials are broadly classified. State and explain the classifications (9mks)
- c) Highlight any two applications of LEDs in electronic circuitry. (2mks)
- d) Briefly explain how a photo-diode works. (3mks)