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KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER
MAIN EXAMINATIONS

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

COURSE CODE: SPH 216

COURSE TITLE: ELECTRONICS I

DURATION: 2 HOURS

DATE: 7/8/ 2018 TIME: 9-11

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) Compute the current in the 23-Ω resistor of Fig1(a) by applying the superposition principle.(6mks)

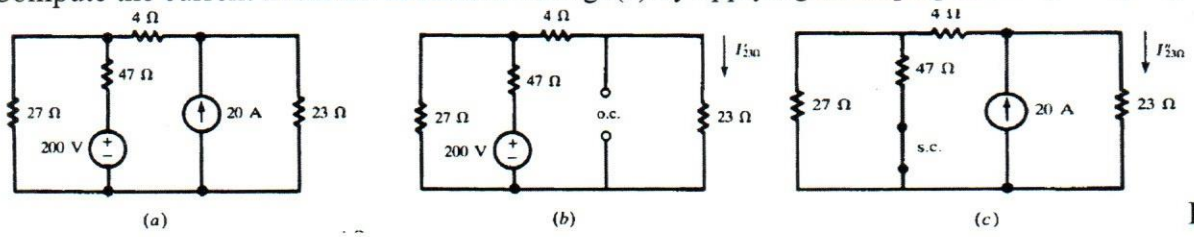


Fig. 1

b) State Norton Theorem (1mk)

c) Define the term doping (1mk)

d) Compare the forward bias characteristics for silicon and Germanium indicating the knee voltage (2mks)

e) Distinguish between *ideal voltage source* and *ideal current source*. (2mks)

f) State Kirchhoff's laws (2mks)

g) A transistor is connected in common emitter (CE) configuration in which collector supply is 8V and the voltage drop across resistance R_C connected in the collector circuit is 0.5V. The value of $R_C = 800\ \Omega$. If $\alpha = 0.96$, determine:

(i) collector-emitter voltage (2mks)

(ii) base current (2mks)

h) Draw circuit symbols to differentiate between npn and pnp transistors (2mks)

i) Solve the circuit in Fig. 2 by the mesh current method. (4mks)

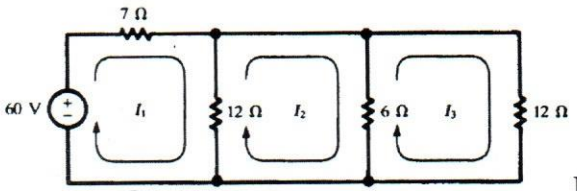


Fig.2

j) Given the Circuit in Fig 3, find the voltages at all nodes (4mks

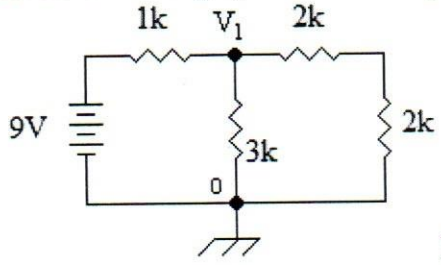


Fig.3

k) Distinguish between intrinsic and extrinsic semiconductors (2mks)

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 4. (10mks)

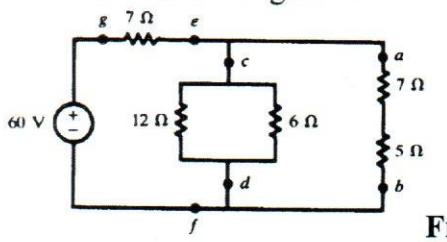


Fig 4

b) Solve the circuit in Fig 5 using

i) Branch current method (5mks)

ii) The node voltage method. (5mks)

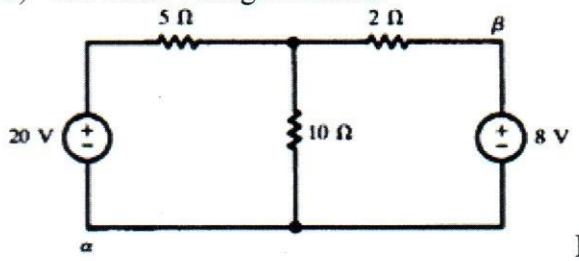
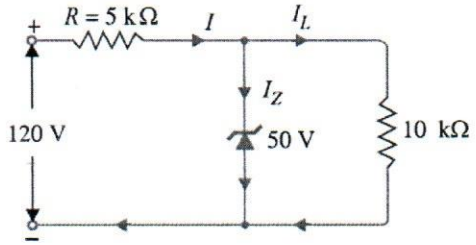


Fig 5

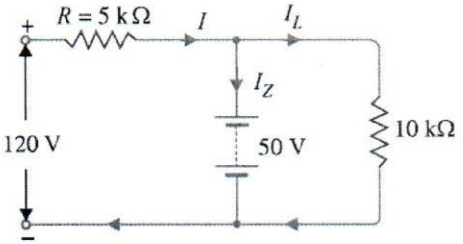
QUESTION THREE (20mks)

a) State any three advantages of light-emitting diode (LED) (3mks)

b) For the circuit shown in Fig. 6 (i), find:
(i) the output voltage (ii) the voltage drop across series resistance (iii) the current through Zener diode. (7mks)



(*i*)



(*ii*)

Fig 6

c) Fig. 7 shows the basic photo-diode circuit. Describe how it operates and explain its two important characteristics (10mks)

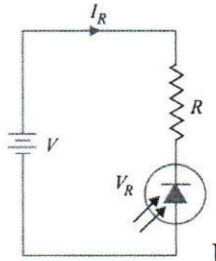


Fig 7

QUESTION FOUR (20mks)

a) Mention the applications of CE, CB and CC configurations of BJT's (6mks)

b) Differentiate between FET and BJT transistors (8mks)

c) Draw the three configurations in which a transistor may be connected showing battery Connections for each (6mks

QUESTION FIVE (20mks)

a) Outline any three properties of semiconductors (3mks)

b) Based on Energy band theory, materials are broadly classified. State and explain the classifications (6mks)

c) Describe the process of full wave rectification using a bridge circuit (6mks)

d) Draw the circuit diagram for a full wave rectifier using centre tapped transformer (3mks)

e) Distinguish between Recombination and Carrier lifetime (2mks)

END