

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA  
SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION  
DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION  
FIRST SEMESTER 2019/2020 EXAMINATION IN ITE 352

COURSE TITLE: SEMI-CONDUCTOR DEVICES

COURSE CODE: ITE 352

UNITS: 2

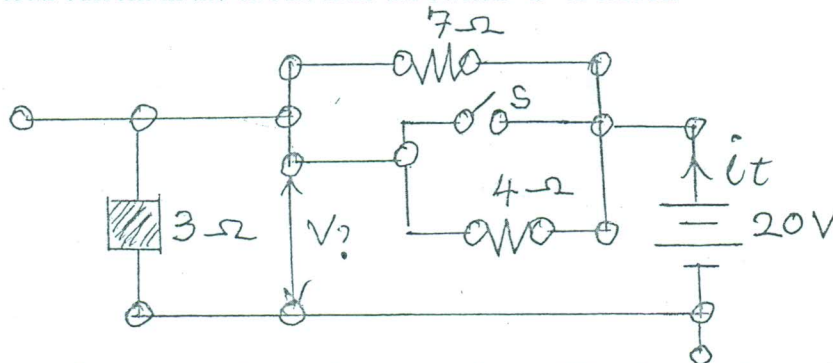
TIME ALLOWED: 2 HOURS

COURSE LECTURER: ENGR. S. A. MUSA

INSTRUCTION: ANSWER QUESTION ONE (1) AND THREE (3) OTHERS

Q1 (a) Carefully study the circuit given on this question one (1) and calculate:

- i. The total current flowing in the circuit before the switch "S" is closed
- ii. The total current in the circuit after the switch "S" is closed.



Q1 (b) Replace the  $7\Omega$  resistor in the parallel group with an "X" resistor and assume a suitable value for it such that the total current in the circuit will be 4A when the switch "S" is not closed, and then calculate the voltage across the  $3\Omega$  resistor.

Q2 (a) Illustrate the distribution of electrons according to their energy levels for the following atoms:

- (i) Hydrogen atom, (ii) Germanium atom, (iii) Boron atom and (iv) Phosphorus atom

Q2 (a) Calculate the needed extra amount of energy to excite an electron from "K" to "L" shell, "L" to "M" and "M" to "O" shell

Q3 (a) Define the following:

- (i) Intrinsic semi-conductor, (ii) Extrinsic Semi-conductor, (iii) Valence band, (iv) Conductor and (v) Insulator

Q4 (a) Narrate / Describe briefly how an N and P type of semi-conductor are produced

Q4 (b) Define the following: (i) Formation of depletion layer, (ii) Majority charge carriers and (iii) Minority charge carriers

Q5 (a) Under BJT, illustrate the structures and symbols for PNP and NPN transistors and explain the functions of emitter, base and collector.

Q5 (b) How does the band gap indicate whether or not your substance is an insulator, semi-conductor or conductor? Expatriate further.