FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE AND TECHNOLOGY
SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING

TRADE DIPLOMA IN ENGINEERING PROGRAM
EEE509 POWER CONTROL ELECTRONICS

FINAL EXAMINATION
(SEMESTER 2, 2016)

DATE/TIME/ROOM – Refer to Timetable

INSTRUCTIONS TO CANDIDATES

1. You are allowed 10 minutes extra time during which you are not to write.
2. Begin each answer on a fresh new page and use both sides of the sheets.
3. Write your identification number on the top of each attached sheet.
4. Insert all written foolscaps, graph paper, drawing paper etc. in their correct sequence and secure with string provided.
5. For all sheets of paper in which has been done, cross it through and you must attach to your answer script.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. *ANSWER ONLY TEN QUESTIONS.*

TOTAL NO. OF PAGES - 2

1. What is p-n junction? Explain the formation of potential barrier in a p-n junction. Draw and explain the V-I characteristics of p-n junction. (10 Marks)
2. Define and describe the following parameters for a p-n junction diode
   (a) Breakdown voltage (2 Marks)
   (b) Knee voltage (2 Marks)
   (c) Limitations in operating conditions of p-n junction (4 Marks)
   (d) Peak inverse voltage (PIV) rating. (2 Marks)
3. Demonstrate with neat sketches and explain the operation of **any two** of the following rectifiers :
   (a) Half wave rectifier using crystal diode (5 Marks)
   (b) Centre-tap full wave rectifier using crystal diode (5 Marks)
   (c) Full wave bridge rectifier (5 Marks)
4. What is zener diode? Explain the working of zener diode in ON state and OFF state and as a constant voltage source across the load. (10 Marks)
5. What is a transistor? Draw the normal circuit diagram of pnp and npn transistor. Describe the Common Base (CB) input and output characteristics. (10 Marks)
6. Describe the operation and characteristics of
   (a) Junction Field Effect Transistor (JFET) (5 Marks)
   (b) Metal Oxide Semiconductor Field Effect transistor (MOSFET) (5 Marks)
7. Explain the construction of SCR and draw the equivalent circuit and explain the working from this equivalent circuit. Explain the V-I characteristics of SCR. (10 Marks)
8. Explain **any two** of the following with the suitable circuit diagram
   (a) Buck converter (5 Marks)
   (b) Boost converter (5 Marks)
   (c) Buck/boost converter (5 Marks)
9. Explain **anyone** of them with suitable circuit diagram (with RL load) and obtain the output voltage expression (10 Marks)
   (a) Single phase semi converter
   (b) Single phase full converter
   (c) Single phase dual converter
10. Explain speed control of DC motor or AC motor by any one method. (10 Marks)
11. **Choose one** of the following converters and discuss its operation with suitable circuit diagram (10 Marks)
    (a) Single phase cycloconverter
    (b) Three phase to Single phase cycloconverter
    (c) Three phase to three phase cycloconverter

[THE END]