EEE 392 ELECTRONICS FOR ELECTRICIANS 2016

FNU FIJI NATIONAL UNIVERSITY

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME: CERTIFICATE IV IN ELECTRICAL ENGINEERING-STAGE 2

UNIT CODE: EEE392 **TITLE:** ELECTRONICS FOR ELECTRICIANS

FINAL EXAMINATION – TRIMESTER 2, 2016

ROOM: .....

TIME: .....

DATE: .....

INSTRUCTIONS TO STUDENTS'

1. You are allowed 10 minutes Extra reading time during which you are NOT to write.
2. Begin each answer on a fresh page and use both sides of the sheet.
3. Write your candidate-number at the top of each attached sheet
4. Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with string
5. For all sheets of paper on which rough/draft work has been done, cross it though and you MUST ATTACH to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. ANSWER ALL QUESTIONS.
8. Show all workings where necessary.
9. Do not use programmable calculators, especially the ones that do the conversions of number systems.

*10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!***

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SECTION A: Multiple Choice (30 marks)

Instructions:

Choose the appropriate answer from each question by writing the correct alphabet beside each question number.

1. What are the two major categories of the resistors?

   a) low and high ohmic value
   b) commercial and industrial
   c) low and high power value
   d) fixed and variable

2. A coil of wire wound on a core of iron is:

   a) A transformer
   b) A ferrite rod
   c) A radio receiver aerial
   d) An inductor

3. Most electronic circuits require a voltage between 5 and 12 volts. Which of the following would provide an ideal way of initially reducing the mains voltage to a suitable value?

   a) Regulator
   b) Step-up transformer
   c) Step-down transformer
   d) Switch

4. What is the greatest threat to a diode and a transistor
   a) Heat
   b) Short Circuit.
   c) Open circuit
   d) Contact.

5. A transistor may be used as a switching device or as

   a) a Fixed resistor
   b) a Tuning device
   c) a rectifier
   d) an amplifying device

6. A transformer

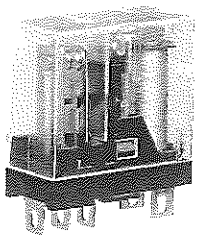
   a) Changes ac to dc
   b) Changes dc to ac
   c) Steps up or down dc voltages
   d) Steps up or down ac voltages

7. Testing a good diode with an ohmmeter should indicate
   a) High resistance when forward or reverse biased
   b) Low resistance when forward or reversed biased.
   c) High resistance when reverse biased and low resistance when forward biased
   d) High resistance when forward biased and low resistance when reverse biased

8. If an open capacitor is checked with an ohmmeter, the needle will
   a) Stay on zero
   b) Stay on infinity
   c) Move from zero to infinity
   d) Move from infinity to zero

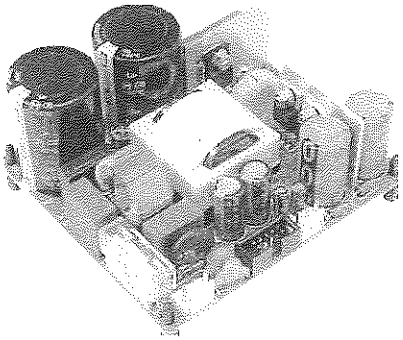
9. Identify the component shown on the right:

   a) Relay
   b) Coil
   c) Inductor
   d) Choke



10. With the positive probe is connected onto the base of an NPN transistor, the ohmmeter reading between the other transistor terminals should be:
    a) open
    b) infinite
    c) low resistance
    d) high resistance

11. Identify the circuit board shown on the right:



Signal filtering board
   a. Switch-mode power board
   b. Rectifier board
   c. Analog to digital conversion board
   d. All of the above.

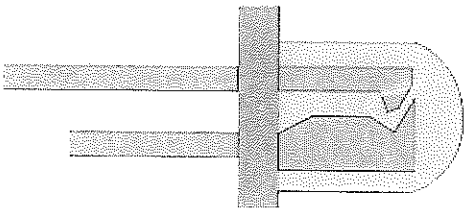
12. A choke in the fluorescent light is an example of a :
   a) Capacitor.
   b) Resistor.
   c) LDR.
   d) Inductor.

13. If you want to do fine adjustment in the variation of the capacitance, name the appropriate component:
   a) Trimpot.
   b) Trimmer.
   c) Variac.
   d) Potentiometer.

14. Name the switch that will ONLY make contact if you press it.
   a) Toggle switch.
   b) Push button switch.
   c) Slide switch.
   d) DIP switch.

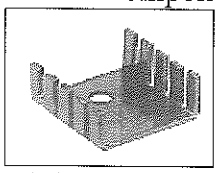
15. What is the key component used in a "sunset" switch assembly?
   a) VDR
   b) LDR
   c) Thermistor
   d) Rheostat.

16. Name the component shown in the diagram:



   a) Light emitting transistor
   b) Light dependent diode
   c) Light dependent transistor
   d) Light emitting diode

17. Identify the electronic component shown:

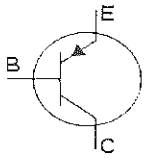


a) Heat shrink
b) Heat fins
c) Heat sink
d) Diode

18. When is a capacitor fully charged?
a) When the voltage across its plate is ½ of the voltage from ground to one of its plate.
b) When the Voltage at the terminals of the Capacitor, V_C, is equal to the Power Supply Voltage; Vc = Vs.
c) When the voltage across the plates is 0.707 of the input voltage
d) When the current through the capacitor is directly proportional to the area of the plates

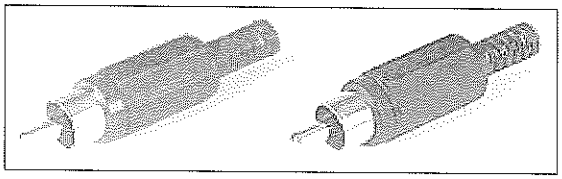
19. A resistor marked 2k7 means:
a) 2700Ω ±5%
b) 2.7 k Ω ±5%
c) 0.0027 MΩ ±5%
d) All of the above.

20. From the symbol shown, identify what type of component it is.



a) NPN transistor
b) Light dependent transistor
c) Phototransistor
d) PNP transistor

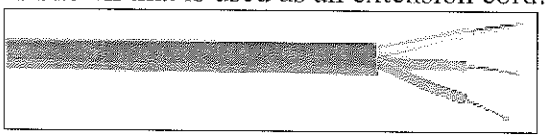
21. Identify the type of AV connectors shown here:



a) BNC connector
b) N-Type connector
c) UHF connector
d) RCA connector

22. A socket fits into a _____.
a) Male socket.
b) Socket
c) Plug
d) Both a) and b)

23. Name the cable as shown that is used as an extension cord:



a) Twisted stranded cable
b) 3-core flex
c) Speaker cable
d) Cat-5E

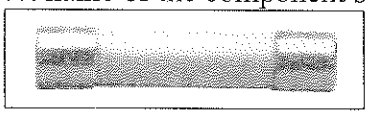
24. What is the name of the part inside a relay that is moved by the action of the electromagnets.

a) armature
b) conductor
c) plunger
d) solenoid

25. What percentage of current is an NPN transistor reaches the collector?

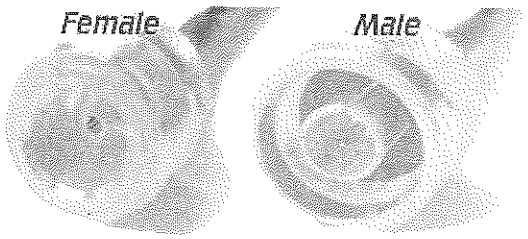
a) 50%
b) 75%
c) 25%
d) 98%

26. What is the correct name of the component shown below:



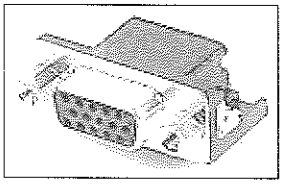
a) Resistor
b) Capacitor
c) Cartridge Fuse
d) Slide potentiometer

27. Choose the correct name of the RF connectors shown:



a) BNC connectors
b) N-type connectors
c) UHF connectors
d) Both b) and c)

28. The diagram shows a:



a) E socket
b) D socket
c) D plug
d) E plug

29. In the NPN transistor, what section is made very thin compared with the other two sections?
a) The E or emitter section
b) The P or base section
c) The C or collect section
d) The Emitter base collection

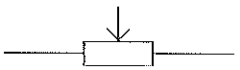
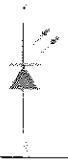
30. Which component is shown below?

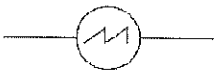
a) Push button
b) Toggle switch
c) Slide switch
d) DIP switch

SECTION B: Matching – Component Symbols (20 marks)

Instructions:

Match the diagrams to the appropriate answer by write the correct alphabet against the question number in your answer booklet:

a)	Toggle switch	i)	
b)	Photodiode	ii)	
c)	Iron-core	iii)	
d)	Fuse	iv)	
e)	Oscillo-scope	v)	
f)	SCR	vi)	
g)	Earth	vii)	
h)	Light emitting diode	viii)	
i)	DC supply	ix)	
j)	Step up transformer	x)	

k)	Light Emitting Diode	xi)	
l)	Trimmer	xii)	
m)	Diac	xiii)	
n)	PNP transistor	xiv)	
o)	Diode	xv)	
p)	Polarized capacitor	xvi)	
q)	Terminal	xvii)	
r)	Push button switch	xviii)	
s)	Variable resistor (potentio-meter)	xix)	
t)	Light Depended Resistor	xx)	

SECTION C: Short Answer Questions (20 marks)

1. When checking a diode with an ohmmeter, what is indicated by high resistance measurements? *(2 mark)*

2. What safety precaution must be taken before replacing a transistor? *(2 mark)*

3. What are the two resistance tests that can be done with an ohmmeter? *(2 marks)*

4. What is the name of the area is a PN junction that has a shortage of electron and the holes? *(1 mark)*

5. How do you eliminate heat from damaging a transistor? *(1 mark)*

6. Define the following terms:

   a) RC filter
   b) Rectifier
   c) Regulator
   d) Reverse Bias
   e) Ripple Frequency
   f) Ripple voltage ..... *(2 marks each)*

SECTION D: Data Sheets, Operations & Calculations (30 marks)

1) Using appropriate diagrams, explain what happens in an SCR when the Gate is open. (5 marks)

2. Data sheets:

From the transistor data sheet shown below, determine the:

TYPE	CASE	POL MAT	V_{CE}	V_{CB}	$I_{C\,mA}$	V_{CES} @$I_{C\,mA}$	H_{fe} @ $I_{C\,mA}$	P(TOT) mW	USE	EQUIVALENT
2N3055	TO-3	NS	60	70	15 A	1.1 4A	20-70 4A	115W	G.P. POWER	BDY 20
TIP 3055	TOP-3	NS	70	100	15 A	1.1 4A	20 4A	90W	POWER OUTPUT	MJE 3055

a) Current gain of BDY20 and what current can this transistor operate from? (2 marks)
b) Material used in the MJE 3055? (1 mark)
c) Abbreviation of G.P. power from the table. (1 mark)
d) Power dissipation of BDY 20? (1 mark)
e) Package of 2N3055? (1 mark)
f) Polarity of the TIP 3055 transistor? (1 mark)

3)

a. Explain the process of measuring the frequency of a sine wave using an oscilloscope. Mention the controls you will adjust and how you will read the signal display to work out the frequency of the wave form. (2 marks)

b. You are given a linear power supply utilizing a full wave bridge rectifier that is faulty (No DC voltage output). Draw the diagram of the full-wave bridge rectifier explaining how it operates and list down the steps you will take to locate the fault. (6 marks)

4) Name the component that corresponds to its operation:

a) Impedes the flow of current. (1 mark)
b) Stores electrical charge. (1 mark)
c) Transforms one voltage to another value. (1 mark)
d) Contains a coil and switches contact when the coil is energized. (1 mark)
e) Converts AC to pulsating DC. (1 mark)

5. You are required to control two 240VAC lamps through a 9 volts dc relay. When the AC power is turned on, lamp one lights up and when the relay is turned on (9V dc), lamp 2 lights up and lamp 1 turns off. Draw the schematic and the wiring diagram of the above circuit utilizing a relay, a 9 volt DC power source and 240 Volts AC.

(5 marks, 2.5 for each correct one)

Data Sheets:

Figure & letter coding table

Tolerance	±0.1%	±0.25%	±0.5%	±1%	±2%	±5%	±10%	±20%	±30%
Code	B	C	D	F	G	J	K	M	N

Capacitor Colour Coded table

Colour of band or dot	Colour abbr.	1st digit of value	2nd digit of value	Multiplier if capac. expressed		Tolerance %	Nomin. Voltage if capac. Expressed		Temp. Coeff.
				in ρF	in μF		in ρF	in μF	
Black	bk	0	0	1	1	±20%		10	NP0
Brown	bn	1	1	10	10	±1%	100	1.6	N033
Red	rd	2	2	100	100	±2%	250	4	N075
Orange	og	3	3	1000				40	N150
Yellow	ye	4	4	10000			400	6.3	N220
Green	gn	5	5	100000		±5%		16	N330
Blue	bu	6	6				630		N470
Violet	vt	7	7		0.001				N750
Grey	gy	8	8	0.01	0.01			25	P033
White	wh	9	9	0.1	0.1	±10%		2.5	P470
Red/violet	rd/vt								P100
Orange/orange	og/og								N1500

%%%%%%%%%%%% THE END %%%%%%%%%%%%