



COLLEGE: COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL: SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME: CERTIFICATE IV IN ELECTRICAL ENGINEERING-STAGE 2

UNIT CODE: EEE392

TITLE: ELECTRONICS FOR ELECTRICIANS

FINAL EXAMINATION – TRIMESTER 3, 2015

ROOM: AS PER TIMETABLE
TIME: 2 HOURS & 10 MINUTES

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!**

SECTION A:**MULTIPLE CHOICE****[20 MARKS]****Instructions:**

Choose the appropriate answer from each question and write it alongside the question number in your answer sheet. Each Multiple Choices is worth 1 mark.

1. A resistor marked 2k7J means:
 - A) $2700 \Omega \pm 5\%$
 - B) $2.7K \Omega \pm 5\%$
 - C) $0.0027 M\Omega \pm 5\%$
 - D) All of the above

2. Identify the best resistor in any sunset switch for any street light.
 - A) VDR
 - B) LDR
 - C) Thermistor
 - D) Rheostat

3. What quantity reflects the size of any resistor?
 - A) Its resistance ratings
 - B) Its voltage ratings
 - C) Its Power ratings
 - D) Its current ratings

4. A coil of wire wound on a core of iron is:
 - A) An inductor
 - B) A transformer
 - C) A ferrite rod
 - D) A radio receiver aerial

5. 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

6. What do understand by h_{FE} ?
 - A) Voltage gain
 - B) AC current gain
 - C) DC current gain
 - D) AC voltage gain

7. Which setting will you use to increase or decrease the amplitude on the cathode ray oscilloscope?
- A) Time/division settings.
 - B) Vertical positioning.
 - C) Voltage/division setting of the designated input.
 - D) Horizontal positioning.
8. Name the device used to convert AC to DC:
- A) Inverter.
 - B) Rectifier.
 - C) Converter.
 - D) Filter.
9. An operational amplifier has two inputs:
- A) Positive and Negative.
 - B) Cathode and anode.
 - C) Inverting and non-inverting.
 - D) All of the above.
10. During the soldering process, at times short circuits are formed. These are created by:
- A) A good joint
 - B) Solder bridges
 - C) Heating
 - D) Dry joints
11. The output of a NOT gate is high when:
- A) The input is low
 - B) The input is high
 - C) Voltage is removed from the gate
 - D) The input changes from low to high
12. Identify the transformer used in transmitters.
- A) Power transformer
 - B) Matching transformer
 - C) Audio frequency transformer
 - D) Radio frequency transformer
13. What is the output voltage of the fixed regulator type?
7805
- A) +5 volts
 - B) -5 volts
 - C) +78 volts
 - D) -78 volts

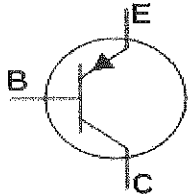
14. To operate properly, a transistor's base-emitter junction must be forward biased with reverse bias applied to which junction?

- A) Base-collector
- B) Collector-emitter
- C) Base-emitter
- D) Collector-base

15. If the supply frequency of a single phase is 50 hertz, the ripple frequency of a full-wave rectifier is:

- A) 50 Hz
- B) 100 Hz
- C) 25 Hz
- D) 12.5 Hz

16. Name the component as pictured.



- A) NPN transistor
- B) Light dependent transistor
- C) Phototransistor
- D) PNP transistor

17. Identify the component symbol as in the given diagram.



- A) Variable Capacitor
- B) Polarized Capacitor
- C) Trimmer Capacitor
- D) Capacitor

18. The three terminals of a FET are termed:

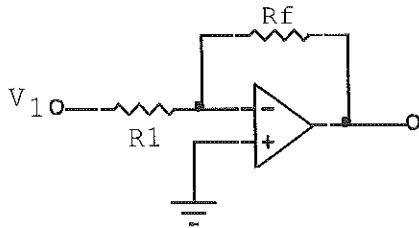
- A) Collector, base and emitter.
- B) Gate, Source and emitter.
- C) Gate, Drain and Source.
- D) Source, Drain and Collector

19. Which Boolean expression expresses the given gate?



- A) $H = A.B$
- B) $H = A + B$
- C) $H = \overline{A.B}$
- D) $H = \overline{A + B}$

20. Identify the following operational amplifier:



- A) Inverting amplifier
- B) Non-inverting amplifier
- C) Voltage follower
- D) Summing amplifier

SECTION B: COMPONENT SYMBOLS & FUNCTIONS [10 MARKS]

Fill in the Blanks by drawing the circuit symbol and the function of the component in the Circuit.

COMPONENT	CIRCUIT SYMBOL	FUNCTION IN THE CIRCUIT
a). Capacitor		
b). Triac		
c). Relay		
d). Transformer		
e). SPDT		

SECTION B PART 2: COMPONENT, CABLE AND CONNECTOR RECOGNITION

[10 MARKS]

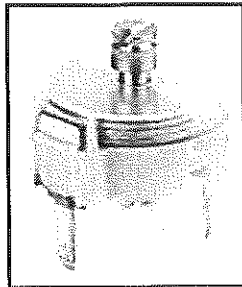
1. Identify the following connectors, cables and components:

(a)



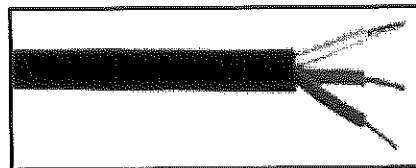
(1 mark)

(b)



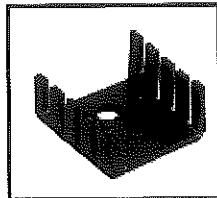
(1 mark)

(c)



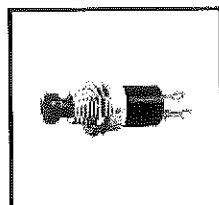
(1 mark)

(d)



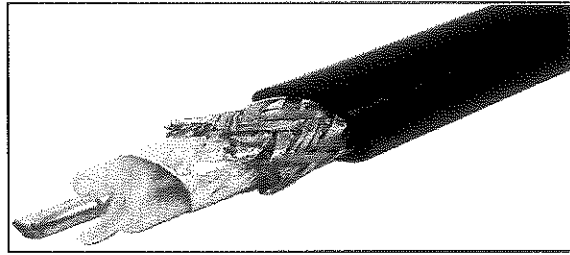
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(e)



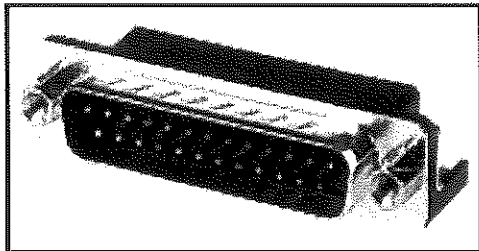
(1 mark)

(f)



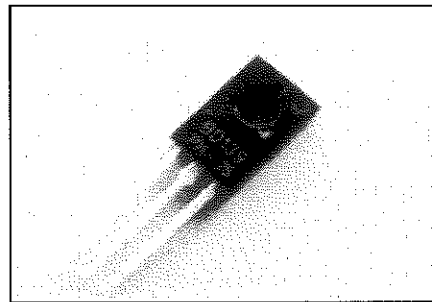
(1 mark)

(g)



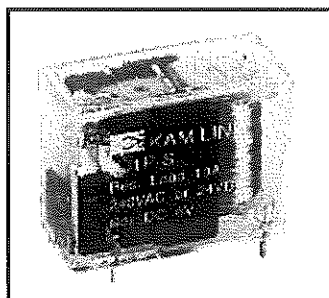
(1 mark)

(h)

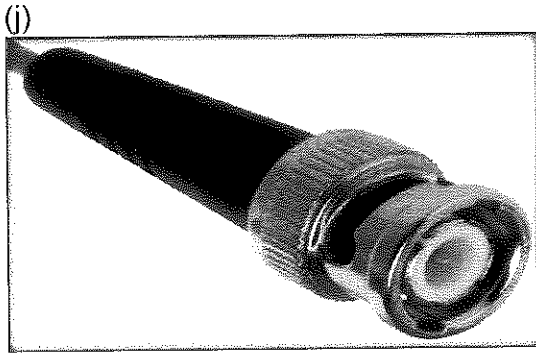


(1 mark)

(i)



(1 mark)



(1 mark)

SECTION C:
Data sheets & calculations

[30 MARKS]

1. If a particular 4-band resistor has its upper range as 110Ω and lower range as 90Ω Calculate the following :
 - a) Range
 - b) Tolerance
 - c) Preferred value
 - d) Color code

(8 marks)
2. Determine the values from the following color-coded 4-band resistors:
 - i. blue, brown, black, silver (2 marks)
 - ii. Green, black, red, gold (2 marks)
 - iii. Red, orange, orange, brown (2 marks)
3. Determine the capacitance values:
 - a) 151 K (1 mark)
 - b) 2n2 D (1 mark)
4. Draw the flow diagram of a basic power supply and briefly explain the main processes that take place before a good clean DC voltage is produced.

(5 marks)
5. The Transistors can be used in several applications. Name the 2 applications of Bipolar Junction Transistor (BJT). (2 marks)

6. Data sheets:

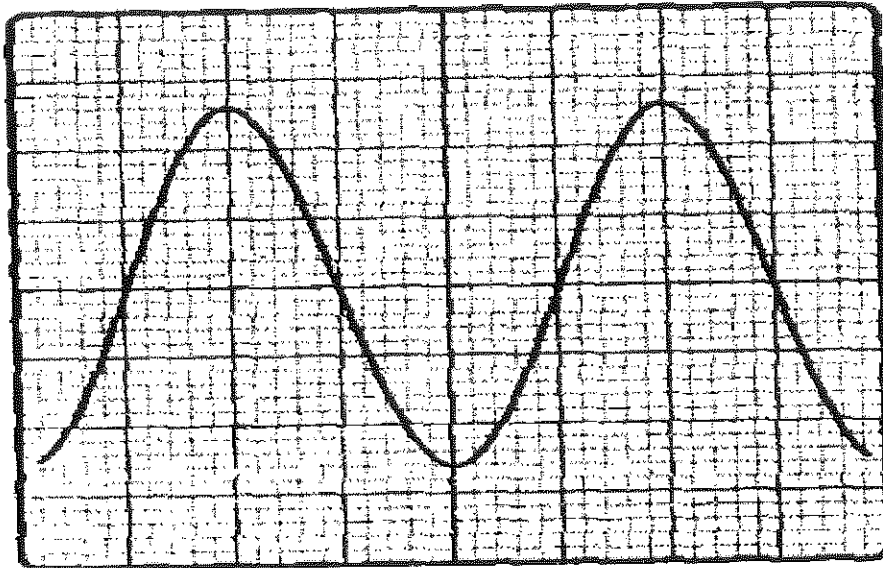
From the transistor data sheet shown below, determine the:

TYPE	CASE	POL MAT	V _{CE}	V _{CB}	I _C mA	V _{GES} @I _C mA	H _{fe} @ I _C mA	P(TOT) mW	USE	EQUIVALENT
BD140	TO-126	PS	80	100	1.5A	0.5@50 0	40@250	8W	G.P. o/p	40410
BC107	TO-18	NS	45	50	100	0.25@1 0	110@450	300	G.P.S. S. amp	BC207, BC147, BC182
BC559	TO-92 VAR 1	PS	30	30	100	0.65@1 00	125@800	500	G.P.S. S. amp	BC159
2N3055	TO-3	NS	60	70	15 A	1.1@4 A	20@70 4A	115W	G.P. power	BDY 20
TIP 3055	TOP-3	NS	70	100	15 A	1.1@4 A	20@ 4A	90W	Power output	MJE 3055

- a) Current gain of BC147 and what current can this transistor operate from? (2 marks)
- b) Material used in all transistors? (1 mark)
- c) Abbreviation of G.P. from the table. (1 mark)
- d) Power dissipation of BC159? (1 mark)
- e) Package of MJE 3055? (1 mark)
- f) Polarity of the BD 140 transistor? (1 mark)

SECTION D**[30 Marks]****Sketches, Analysis & Operation**

1. Calculate the following if the scope scale is set to 5mV/division and 25 μ s/division.



- | | |
|-----------------------|----------|
| a) Time for one cycle | (1 mark) |
| b) Frequency | (1 mark) |
| c) V_{P-P} | (1 mark) |
| d) V_P | (1 mark) |
| e) V_{RMS} | (1 mark) |
2. With the use of suitable sketches clearly describe the operation of a **Full-Wave Bridge Rectifier circuit**.
- (Marks: Cct-2, Waveforms-2, Operation-2) (6 marks)

3. **Fig - 4a** below shows a circuit diagram of an Op-Amp circuit.
- i) Identify the circuit. (1 mark)
 - ii) Calculate the **output Voltage (V_o)** when V_{in} is 2 volts. (3 mark)

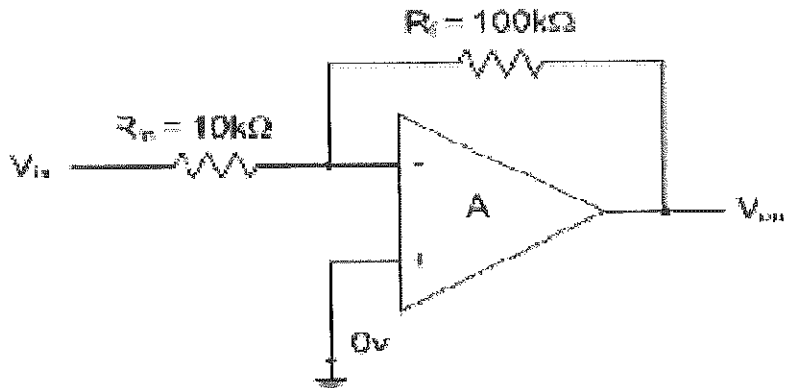
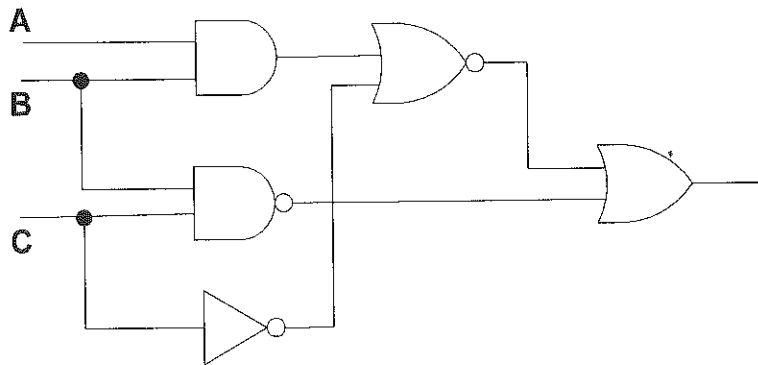


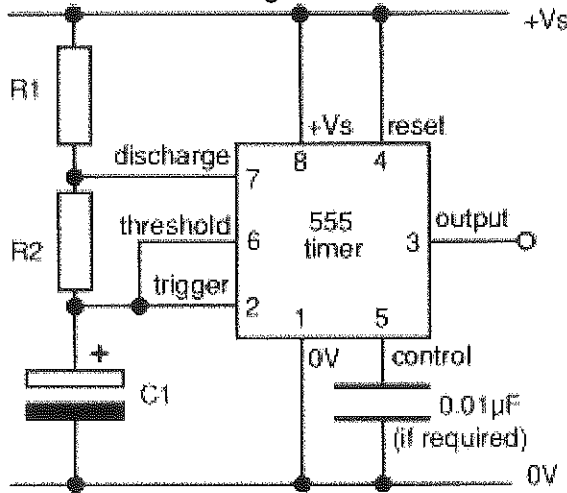
Fig - 4a

4. Show the behaviour of the following circuit with a truth table by letting output = Q. (5 marks)



5. Draw the circuit symbol for the NPN and PNP transistors and explain the test with DMM to check if both transistors are in working condition? (5 marks)

6. A certain circuit is given:



- a) Identify the application. (1 mark)
- b) What is the frequency of the O/P signal if $R1 = 1\text{ k}\Omega$, $R2 = 10\text{ k}\Omega$ and $C1 = 0.1\text{ }\mu\text{F}$? (3 marks)
- c) Sketch the output waveform (1 mark)

*****THE END*****