



FNU FIJIANATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

CERTIFICATE IV IN ELECTRICAL ENGINEERING

EEE392 – ELECTRONIC FOR ELECTRICIANS 1

FINAL EXAMINATION – PENSTER 4, 2017

DATE: As per timetable

TIME: As per timetable

TIME ALLOWED: 2 hours 10 minutes

INSTRUCTIONS

1. *You are allowed 10 minutes reading time during which you are NOT to write.*
2. *Begin each section on a new 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 each one through and ATTACH these 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. Show all working clearly where necessary.*
8. *Programmable calculators are not allowed.*
9. *Check your work before you leave the examination hall.*
10. *Datasheet is attached.*

Section A – Multiple Choice

[20 marks]

Choose the appropriate answer from each question by writing the alphabet beside the question number in your answer booklet.

1. What quantity reflects the size of any resistor?
 - A. Its current rating
 - B. Its resistance
 - C. Its voltage rating
 - D. Its power rating

2. If you wish to do fine adjustment in the variation of the capacitance, name the appropriate component.
 - A. Trimpot
 - B. Trimmer
 - C. Variac
 - D. Potentiometer

3. What type of connectors is used at the input of an oscilloscope?
 - A. UHF connectors
 - B. Co-ax connectors
 - C. DIN connectors
 - D. BNC connectors

4. Choose the component that contains discrete circuitries?
 - A. Integrated circuit
 - B. Transistor
 - C. Capacitor
 - D. Inductor

5. In which colour band will you find the range for either the resistance or capacitance?
 - A. First band
 - B. Second band
 - C. Multiplier band
 - D. Tolerance band

6. Identify the best resistor used for a sunset switch for any street light.
 - A. VDR
 - B. LDR
 - C. Thermistor
 - D. Rheostat

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7. The three terminals of a bipolar junction transistor are;
- A. P.N.P
 - B. N.P.N
 - C. Input, Output, Earth
 - D. Base, Emitter, Collector
8. How many resistors are contained in the E12 series?
- A. 24
 - B. 25
 - C. 23
 - D. 12
9. The switch that returns to its normally closed (on) position when the button is released is a;
- A. Push-to-make switch
 - B. Push-to-break switch
 - C. DPDT slide switch
 - D. DIP switch
10. The purpose of the braided metal screen outside the inner insulation of coaxial cable is to:
- A. Stop the interference from wanted signals
 - B. Receive the interference from unwanted signals
 - C. Stop the interference from unwanted signals
 - D. Receive the interference from wanted signals
11. The three terminals of a thyristor are;
- A. SCR
 - B. NPN
 - C. Cathode, Anode, Gate
 - D. Base, Emitter, Collector
12. Name the diode that can be used as an indicator.
- A. Diac
 - B. Rectifier diode
 - C. SCR
 - D. Light emitting diode
13. Which tolerance value will you obtain from an E12 resistor series table?
- A. $\pm 10\%$
 - B. $\pm 5\%$
 - C. $\pm 1\%$
 - D. $\pm 20\%$

--- Please turn over ---

14. Which parameter determines the physical size of the capacitor?

- A. Power rating
- B. Voltage rating
- C. Temperature rating
- D. Current rating

15. Determine the resistance value of the surface-mounted-device resistor shown below.

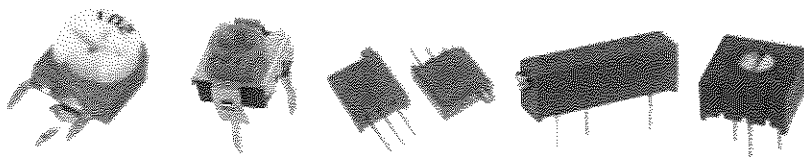


- A. 472Ω
- B. 4700Ω
- C. 47000Ω
- D. 4.7Ω

16. A brown colour band will have a tolerance value of;

- A. 0.1%
- B. 1%
- C. 2%
- D. 5%

17. Identify the component shown below.



- A. Trimmer
- B. Transistor
- C. Inductor
- D. Trimpot

18. A Diode;

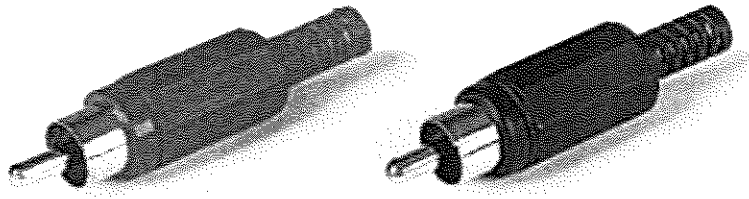
- A. Is used for signal amplification
- B. Is used to filter the ripples in dc supply
- C. Allows current to flow in one direction only
- D. Limits the current flow in a circuit

19. Name the RF cable used to connect the Television display to the aerial:

- A. Twisted stranded cable
- B. Speaker cable
- C. Coaxial Cable
- D. Twin Flex Cable

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20. Name the plug shown below;



- A. BNC
- B. Phono Plug
- C. DC Plug
- D. Jack Plug

Section B – Short Answers

(40 marks)

1. What is the tolerance of a resistor having no fourth colour band? (1 mark)
2. LDRs are special linear resistors. The resistance, _____ (decreases / increases) in a very nearly linear fashion with an increase of the illumination falling onto it. (1 mark)
3. Explain why components such as resistors have power ratings, eg. 56Ω, 5W. (2 marks)
4. There are three important features to consider when selecting a switch. List them. (3 marks)
5. Name two polarized capacitors. (2 marks)
6. What is the multiplier color band for a four band resistor having a value of 2.2kΩ ± 5%. (1 mark)
7. Fill in the table by drawing the circuit symbol and the function of each component. (1 mark each = 20 marks)

COMPONENT:	CIRCUIT SYMBOL:	FUNCTION:
A. LDR		
B. Inductor		

C. Relay		
D. SPST switch		
E. Diode		
F. AC Supply		
G. Light Emitting Diode		
H. NPN Transistor		
I. Transformer		
J. Non polarized Capacitor		

8. Match the appropriate answer by writing the correct alphabet against the question number in your answer booklet. (1 mark each = 10 marks)

A.	Stranded Wire	i.	The central wire carries the signal and the screen is connected to 0V (common) to shield the signal from electrical interference. Screened cable is used for audio signals.
B.	Ribbon Cable	ii.	Suitable for low voltage, low current (maximum 1A) signals where screening from electrical interference is not required. Popular choice for connecting loudspeakers and is often called 'speaker cable'.
C.	3 Core Mains Flex	iii.	One solid wire with a plastic coating used for connections which will not be disturbed, for example links between points of a circuit board.
D.	'Figure 8' Cable	iv.	Is a cable with many conducting wires running parallel to each other on the same flat plane. The cable is wide and flat. Mostly used in computers such as hard drives, CD drives.
E.	Screened Cable	V	Is ordinary copper wire that connects home and many business computers to the telephone company. To reduce crosstalk or electromagnetic induction between pairs of wires, two insulated copper wires are twisted around each other.

F.	Optical Fiber Cable	vi.	Consists of several colour-coded cores of stranded wire housed within an outer plastic sheath. Suitable for low voltage, low current signals where screening from electrical interference is not required.
G.	Single Core Equipment Wire	vii.	Is designed to carry high frequency signals such as those found in TV aerials and oscilloscope leads.
H.	Signal Cable	viii.	Used to connect appliances to the mains supply. It contains 3 cores (for live, neutral and earth), used for the extension cord.
I.	Co-axial Cable	ix	Consists of many fine strands of wire covered by an outer plastic coating used for connections which may be disturbed, for example wires outside cases to sensors and switches.
J.	Twisted Pair	x.	Uses glass (or plastic) threads (fibers) to transmit data. Consists of a bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves. Used for long distant communications such as Pay TV.

Section C – Calculations

(40 marks)

All questions are compulsory. Show your working clearly.

- Determine the lower and upper resistance of the given preferred value of $100\Omega \pm 5\%$. (3 marks)
- Decode the value of the capacitance of capacitors having the following codes;
 - 683J (2 marks)
 - 15 (1 mark)
 - 333 (2 marks)
- Determine the value of the following resistors;
 - Orange, White, Red, Gold (2 marks)
 - Yellow, Purple, Black, Red, Brown (2 marks)
 - 3k9 J (2 marks)
 - R56 (2 marks)
- If a particular 4-band resistor has its upper range as 49.35Ω and lower range as 44.65Ω , calculate the following;
 - Range (2 marks)
 - Preferred value (2 marks)
 - Tolerance (2 marks)
 - Color Code (2 marks)

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5. A current of 10mA flows through a 33k Ω resistor. Determine the following:
- A. power dissipated by the resistor (2 marks)
 - B. the required nominal power rating of the resistor if the derating factor is 2. (2 marks)
6. Determine the colour codes of the following resistances;
- A. 12 Ω \pm 5% (four band resistor) (2 marks)
 - B. 4k7 Ω \pm 10% (five band resistor) (2 marks)
7. You are an electrical engineer for a power generating plant for a boiler system. For the boiler to emit the steam, the sensor capacitance should be in the value between 90nF to 110nF. Determine:
- A. The preferred value of capacitor you will use (3 marks)
 - B. The tolerance (2 marks)
 - C. If you are required to use a non-polarised capacitor, what code capacitor will you use? Indicate the tolerance code as well. (3 marks)

The End

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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.	1 st digit of value	2 nd digit of value	Multiplier if capac. expressed		Tolerance %	Nomin. Voltage if capac. Expressed		Temp. Coeff.
				in pF	in μF		in pF	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