

FNU FIJIANATIONAL UNIVERSITY

COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

CERTIFICATE IV IN ELECTRICAL ENGINEERING-STAGE 4

EEE448- ELECTRONICS FOR ELECTRICIANS 2

FINAL EXAMINATION – PENSTER 1, 2016

DAY/DATE: as per timetable. TIME: 2 HOURS 10 MINUTES

ROOM: as per timetable.

INSTRUCTIONS TO STUDENTS

1. *You are allowed 10 minutes Extra reading time during which you are NOT to write.*
2. *Begin each Son 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 does the conversions of number systems.*
10. ***ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE ROOM!***

Section A**Multiple Choice****[30 marks]**

Select the best answer from the options given by circling the letter (A, B, C or D) in the matrix supplied at the end of the Question Paper and attach to your Answer Booklet.

1. An ideal operational amplifier has
 - a) infinite output impedance
 - b) zero input impedance
 - c) infinite bandwidth
 - d) All of the above

2. How many diodes are found in full – wave bridge single phase rectification?
 - a) 2
 - b) 4
 - c) 1
 - d) 8

3. If the supply frequency of a single phase is 50 hertz, the ripple frequency of a full-wave rectifier is:
 - a) 100 Hz.
 - b) 12.5 Hz.
 - c) 25 Hz.
 - d) 50 Hz.

4. What is the output voltage of the fixed regulator type?
7924
 - a) -792 V
 - b) +82 V
 - c) +24 V
 - d) -24 V

5. The ratio between differential gain and common-mode gain is called:
 - a) Amplitude
 - b) differential-mode rejection
 - c) common-mode rejection
 - d) phase

6. What is the first procedure when troubleshooting any equipment?

- a) Signal injection.
- b) Visual check.
- c) Powering the equipment on.
- d) Visualising the waveform by using a CRO.

7. Name the part of the cathode ray oscilloscope where the beam of electrons is first seen.

- a) Grids.
- b) Deflection plates.
- c) Filament.
- d) Faceplate.

8. Troubleshooting a digital circuit by means of a _____ is the most reliable test instrument to use to measure the voltage.

- a) Logic probe.
- b) CRO.
- c) DMM.
- d) Signal generator.

9. Which of the following pin numbers represent the output terminal of LM741 operational amplifier?

- a) 2
- b) 3
- c) 4
- d) 6

10. Single – phase bridge rectifier normally uses:

- a) Two diodes in it's operation.
- b) One diode in it's operation.
- c) Four diodes in it's operation.
- d) None of the above.

11. VCE approximately equals _____ when a transistor switch is cut off.

- a) VCC
- b) VB
- c) 0.2V
- d) 0.7V

12. Identify the term that describes the value of the waveform that will produce the same heating effect whether if the system is DC or AC.

- a) Maximum value.
- b) Average value.
- c) Root mean square value.
- d) Peak value.

13. Name the device used to convert AC to DC:

- a) Inverter.
- b) Rectifier.
- c) Converter.
- d) Filter.

14. During troubleshooting, the appropriate test instrument; _____ is used for signal injection.

- a) CRO
- b) Signal Generator
- c) DMM
- d) Both a) and b)

15. Which type of filters is used in DC power supplies?

- a) High pass filters.
- b) Band – pass filters.
- c) Band – stop filters
- d) Low pass filters

16. Which test instrument is used to measure the precise resistance of a 100 Ω resistor?

- a) CRO.
- b) Voltmeter.
- c) Ohmmeter.
- d) Ammeter.

17. Unregulated DC power supplies normally have:

- a) No regulator connected after the rectifier stage.
- b) No regulator connected after the filter stage.
- c) A regulator connected after the filter stage.
- d) A regulator connected before the filter stage.

18. Another name for astable timer is:

- a) Free running
- b) One shot
- c) Disruptive running
- d) No running

19. The output of a NOT gate is high when

- a) The input is LOW
- b) The input is HIGH
- c) The input changes from LOW to HIGH
- d) Voltage is removed from the gate.

20. Which two components are commonly used in light dimmers?

- a) SCR and Diac
- b) SCR and Triac
- c) Triac and Diac
- d) MOSFET and Diac

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

- a) collector-emitter
- b) base-collector
- c) base-emitter
- d) collector-base

22. A transistor has a β_{dc} of 250 and a base current, I_B , of 20 μA . The collector current, I_C , equals:

- a) 500 μA
- b) 5 mA
- c) 50 mA
- d) 5 A

23. Name the component used to emit light and is used as an indicator

- a) Diode
- b) Photo diode
- c) Photo transistor
- d) LED

24. Name the component used to interface two circuits of different current magnitudes.



- a) LED
- b) Photo transistor
- c) LED and photo transistor
- d) Opto-coupler

25. The output of an AND gate is LOW

- a) All the time
- b) When any input is LOW
- c) When any input is HIGH
- d) When all inputs are HIGH

26. Identify the transformer used to change the voltage from 240Vac to 12 Vac.

- a) Matching transformer
- b) Step-down transformer
- c) Step-up transformer
- d) Isolation transformer

27. Name the best test instrument to measure frequency.

- a) DMM
- b) Frequency counter
- c) CRO
- d) All of the above

28. The Boolean expression $Y = \overline{A\overline{B}}$ is logically equivalent to what single gate?

- a) NAND
- b) NOR
- c) AND
- d) OR






29. If you have to measure current, which selection will you choose?


- a) Ammeter
- b) Ohmmeter
- c) Voltmeter
- d) Capacitance meter.


30. Choose the best test instrument that has a multi – selection applications for measuring any quantity instead of having more than one test instrument.

- a) CRO
- b) Multimeter
- c) Ammeter
- d) Ohmmeter

SECTION B: Matching [30marks]

1	Block diagram	A	
2	LM317	B	
3	Step up transformer	C	
4	Circuit Diagram	D	
5	LM555	E	
6	Component layout diagram	F	Illustrates the exploded views of an equipment
7	Soldering	G	12 Vac to 240 Vac

8	Step down transformer	H	+ve adjustable regulator
9	NAND gate	I	Components used to interface a high current circuit to a low current circuit
10	LM741	J	Shows a design in a logical fashion that contains component symbols
11	Analogue multimeter	K	-5V
12	Inverting amplifier	L	Instrument that visualizes any waveform
13	AND gate	M	Removing of solder
14	Dual DC power supply unit	N	240 Vac to 12 Vac
15	Photo diode	O	+ 12 V
16	Desoldering	P	In phase
17	Focus Knob	Q	+ve and -ve voltages
18	NOR gate	R	Bonding of two metals
19	Light emitting diode	S	
20	7812	T	180° out of phase
21	Make trace to increase or decrease in amplitude	U	Time/division knob
22	NOT gate	V	OP-Amp
23	AC, GND, DC	W	Input switch
24	Make trace to increase or decrease in time period	X	Timer IC
25	Non-inverting amplifier	Y	Shows the stages of any equipment by the indications of arrows
26	Cathode Ray Oscilloscope	Z	Volts/division knob
27	OR gate	AA	Part of the CRO that functions as a trace clarity knob

28	Opto-couplers	AB	
29	7905	AC	Abbreviated as VOM
30	Assembly Diagram	AD	Shows the physical sizes of the components onto a PCB

SECTION C: Definitions, Statements of Facts, & Formulas

[10 marks]

1. Briefly define the following terms as they refer to semiconductors:

a) Doping

(1mark)

b) Holes

(1mark)

2. The Cathode Ray Oscilloscope (CRO) has several applications. Name any 4 of them.

(4 marks)

3. Fill in the blank spaces.

Name of the Test Equipments	Function	Operating Parameters (Voltage / Current)	Application of such Test Meters/Equipments
Series Test Lamp			
Clamp meter			
Neon Test Lamp (Screwdriver)			
Logic Probes			

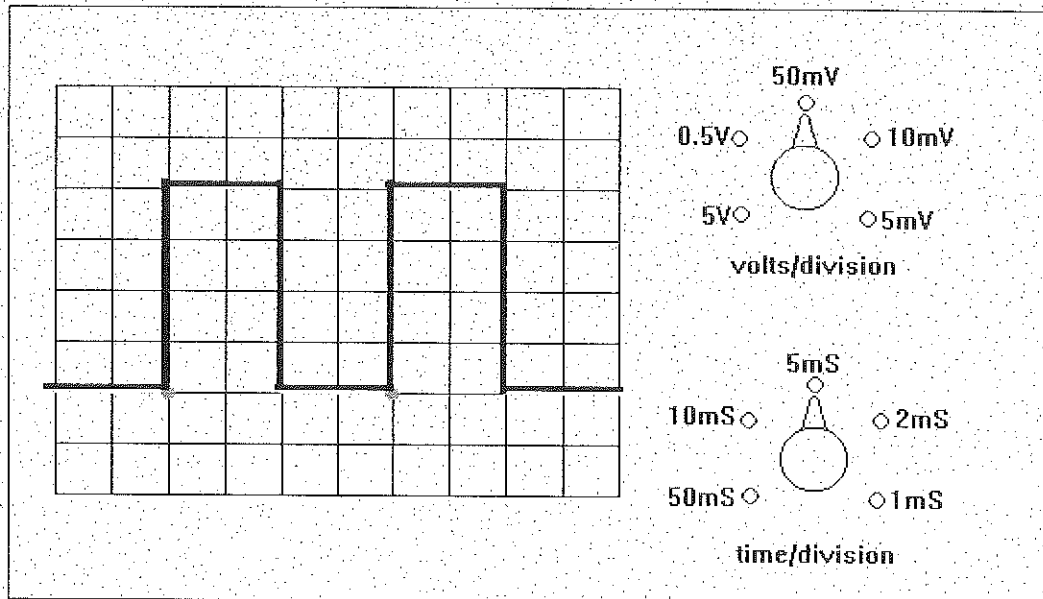
(4 marks)

Section D

Sketches, Analysis & Operation

[30 Marks]

1. From the given diagram, calculate the:



a) Frequency. (2marks)

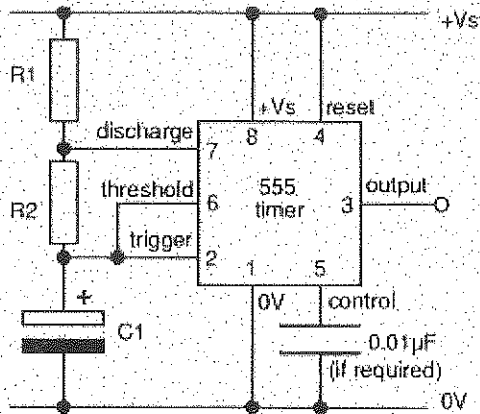
b) Amplitude. (2 marks)

2. List three (3) comparison of Digital and Analogue meters (3 marks)

3. 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)

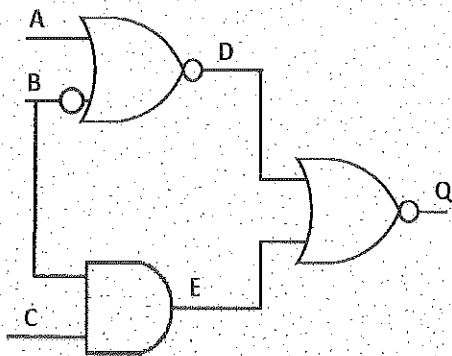
4. A certain circuit is given:



- Identify the application. (1 mark)
- Sketch the waveforms at Pins 2 and 3. Showing them on a common vertical axis. (2 marks)
- 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)

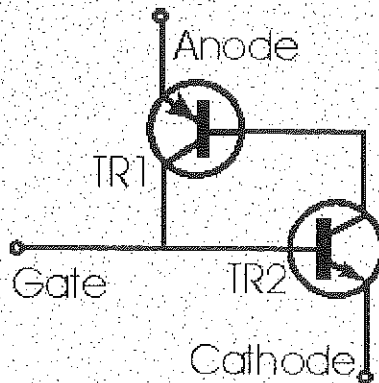
5. Determine the output (Q) combination of the circuit given below.

(5marks)



Inputs			Outputs		
A	B	C	D	E	Q
0	0	0			
0	0	1			
0	1	0			
0	1	1			
1	0	0			
1	0	1			
1	1	0			
1	1	1			

6. An SCR can be represented as shown:



- a) State the voltage polarities at the Anode & Cathode. (2 marks)
- b) What happens when a +ve pulse of current is applied to the Gate? (2 marks)

- 7.i) State the purpose of a filter in a DC power supply. (1mark)
- ii) Sketch a basic LED voltage indicator, showing typical voltages and currents. (2marks)

THE END