

**T060**

**Monday, 03/11/2014**

**8.30 – 11.30 AM**



P.O. BOX 2707 Kigali, Rwanda Tel: (+250) 255113365

**ADVANCED LEVEL NATIONAL EXAMINATIONS, 2014**  
**TECHNICAL AND PROFESSIONAL TRADES**

**EXAM TITLE: General Electronics**

**OPTIONS:**    -    **Computer Electronics (CEL)**  
                      -    **Electronics and Telecommunication (ETL)**

**DURATION:    3hours**

**INSTRUCTIONS:**

The paper is composed of **three (3) Sections** :

Section **I**: Thirteen **(13)** questions, all **Compulsory**. **55marks**

Section **II**: Five **(5)** questions, **Choose any Three (3)**. **30marks**

Section **III**: Three **(3)** questions, **Choose any One (1)**. **15marks**

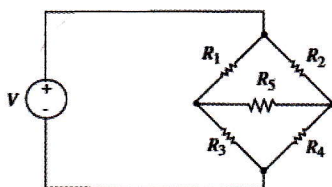
## SECTION I. THIRTEEN (13) COMPULSORY QUESTIONS.

01. What is the behavior of a Common Emitter amplifier when you remove bypass capacitor across the emitter-leg resistor? **2marks**

02. A Field effect transistor operates with a drain current of 100 mA and a gate-source bias of -1V. If the device has a forward transfer conductance in common source mode of 0.25S, determine the change in drain current (in mA) if the bias voltage increases to -1.1V. **5marks**

03. Classify IC's on the basis of their chip size. **4marks**

04. From a bridge circuit below, using schematics, show how to get Thevenin equivalent of the circuit facing the resistance  $R_5$ . **4marks**

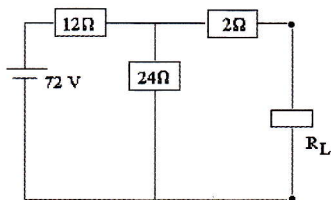


05. Identify five (5) advantages of FETs over BJTs. **5marks**

06. Draw the block diagram of a typical operational amplifier by specifying its main functions. **7marks**

07. Using a block diagram show the structure of a sequential circuit and identify different possible states. **5marks**

08. For the circuit shown below, find the value of  $R_L$  for maximum power transfer. **5marks**

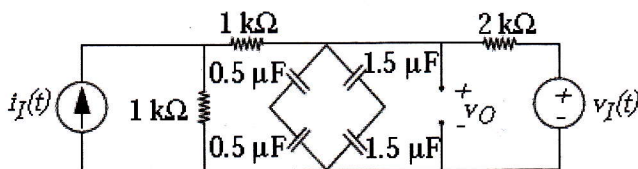


09. Differentiate the oscillator from amplifier. **5marks**

10. Calculate the resonant frequency of a Wien Bridge oscillator when  $R = 17k\Omega$  and  $C = 3200pF$ . **3marks**

11. Design RC elements of a Wien Bridge oscillator, for operation at 4.5 kHz. **3marks**

12. Consider the circuit bellow and determine the set of capacity by a single capacity. **5marks**



13. What is the avalanche breakdown? **2marks**

## SECTION II. ATTEMPT ANY THREE (3) QUESTIONS.

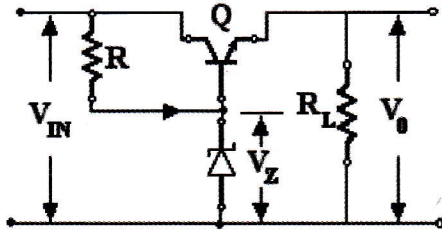
14. For the series regulator given below:

$$V_{in} = 15V, R = 200\Omega, \text{ the transistor gain } \beta = 50$$

$$R_L = 1.2K\Omega, V_Z = 10V \text{ and } V_{BE} = 0.4V$$

Determine :

- a) output voltage      b) load current      d) Zener current.



10marks

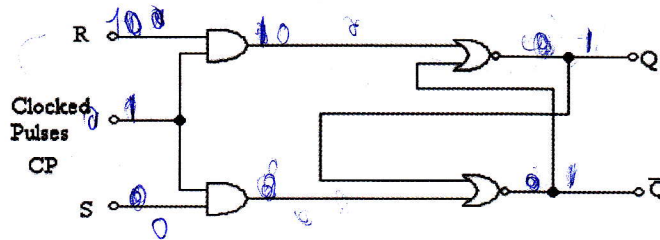
15. a) Consider the following circuit and determine output Q if the conditions on R, CP and S are the following and Q is initially at 1.

8marks

CP: 0 111 000 111 000 111 000

R: 0 010 010 000 010 010 000

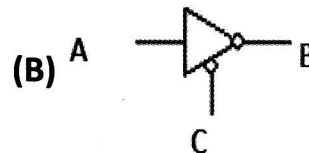
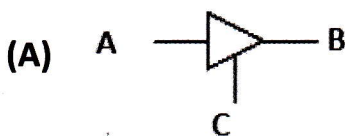
S: 0 000 100 010 000 000 010



b) Why is Hysteresis desirable in Schmitt-trigger?

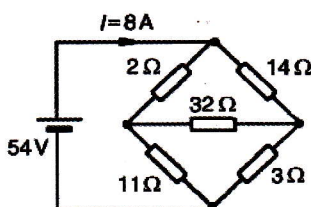
2marks

16. Identify the component represented by each of the following symbols and describe its function using a truth table.



17. a) For the bridge network shown in Figure below determine the currents in each of the resistors.

8marks



b) Prove that for a class- B amplifier the overall efficiency is equal to 78.5%

2marks



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