THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL OF TANZANIA

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

083 **RADIO AND TV SERVICING**

(For Both School and Private candidates)

Time: 3 Hours **Year: 2022**

Instructions

1. This paper consists of section **A**, **B** and **C** with total of **fourteen (14)** questions.
2. Answer **all** questions in section **A** and **B**, and **three (3)** questions from section **C.**
3. Section **A** carries **ten (10)** marks, section **B** and **C** carry **forty five (45)** marks **each.**
4. Cellular phones, and any unauthorized materials are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet (s).

SECTION A (10 marks)

Answer **all** questions in the section

1. Choose the correct answer for each item (i) to (x) and write its letter in the answer booklet provided:

i) What does the term "retrace" referred to as used in TV technology?

A. Synchronizing pulse
B. Field scanning
C. Back porch
D. Interlaced scanning
E. Fly back.

ii) What is the value of the potential barrier for Germanium diode?

A. 3V
B. 6V
C. 0.3V
D. 0.6V
E. 0.7V

iii) Which one is an oscillator which utilizes capacitive voltage divider in providing feedback?

A. Hartley
B. Colpitts
C. Armstrong
D. Multivibrator
E. Wien

iv) In what type of wave is UHF signal range propagated?

A. Ground wave
B. Sinusoidal wave
C. Sky wave

D. Surface wave

E. Space wave.

v) Which of the following diodes possess negative resistance characteristics?

A. Zener diode

B. Schottky diode

C. Tunnel diode

D. PN junction diode

E. Varactor diode.

vi) Which stage of a d.c power supply use a zener diode as a main component?

A. Rectifier

B. Voltage divider

C. Regulator

D. Filter

E. Load.

vii) Which type of instrument is recommended for measuring A.C current?

A. Induction type ammeter

B. Moving iron type ammeter

C. Moving iron voltmeter

D. Permanent magnet type ammeter

E. Hot wire type ammeter.

viii) What will be the effect to the image produced, if the picture tube operates under poor convergence?

A. The image will have chroma phase shift

B. The image will have random interference

C. The image will have colour fringing

D. The image will have unstable sync lock

E. The image will have mutual interference

ix) What are the factors that determine the amount of the current flowing in a capacitor?

A. Area, distance between plates and material used.
B. Capacitance, area and material used.
C. Distance between plates, dielectric and material used.
D. Capacitance, distance between plates and area.
E. Capacitance, distance between plates and material used.

x) Which one is true about an amplitude modulated wave in radio communication systems?

A. Is the sum of carrier and the modulating signal.
B. Is the difference between the carrier and the modulating wave.
C. Is the product of the carrier and the modulating signal.
D. Is the sum of the carrier and its product with modulating signal.
E. Is the suppressed carrier signal and modulating wave?

SECTION B (45 Marks)

Answer **all** questions from this section

2. (a) State the safety factors to be considered in any 9 electronics and electrical workshop.

   (b) Give four causes of accidents in electronics and electrical workshops.

   (c) State the importance for having a first aid kit in a work shop.

3. (a) Explain the main purpose of communication engineering systems

   (b) calculate the wavelength of electromagnetic wave propagated at a frequency of 300 MHz.

4. (a) Why interlacing scanning is used in TV signal transmission?

   (b) If the number of lines per field in a TV system is $262\frac{1}{2}$ and its

corresponding number of frames per second is 30;determine the number of lines per second in that system.

5. (a) State what will happen if a superhet radio receiver operates without a loudspeaker.

   (b) Draw a cross-over network that employs only a tweeter and woofer.

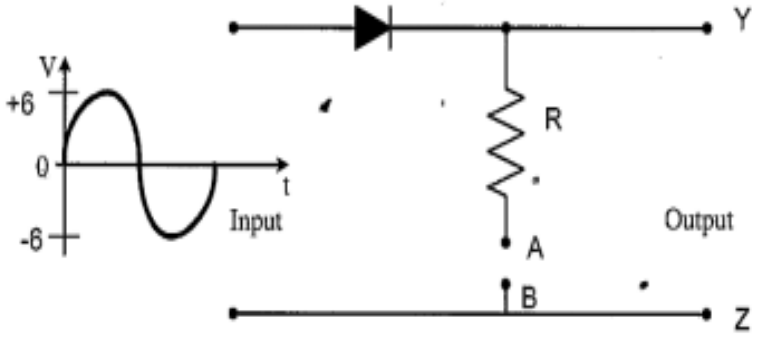
6. (a) How are transistor junctions biased in order to operate in the following regions?

   (i) Active region (ii) Saturation region

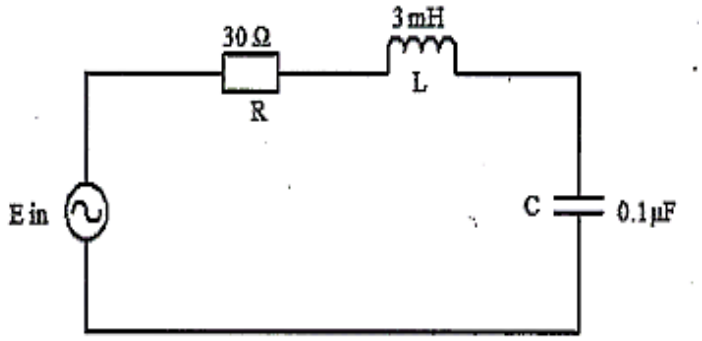
   (b) What are the two features that must be possessed by a good amplifier?

7. (a) What is the function of a diode in detector circuit of an AM radio receiver?

   (b) Study the figure below and sketch the waveform that would be observed at point Y and Z when point A and B are connected by a conducting wire.



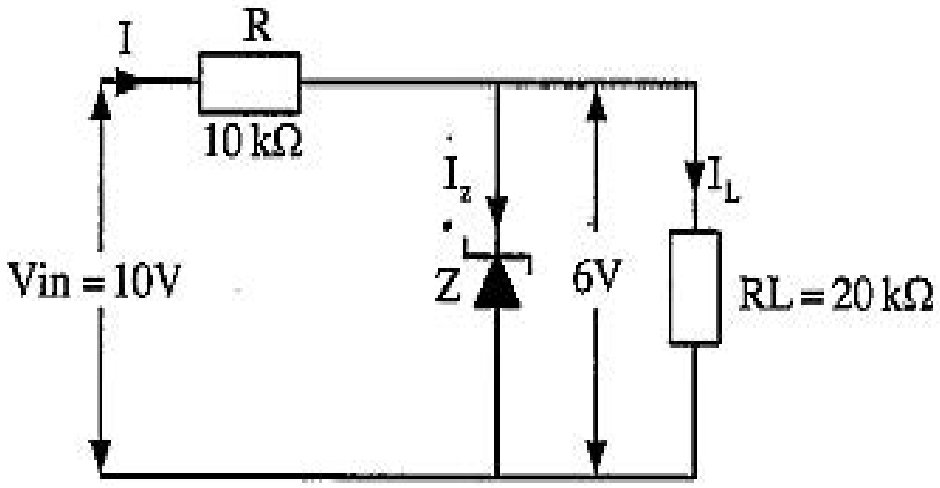
8. Study the given circuit and calculate the impedance of the circuit when its operating frequency (f)= 12 KHz.



9. (a) Why RF amplifier is a sensitive stage in a radio receiver?

   (b) Draw a well labelled block diagram of a tuned-radio frequency receiver.

10. Study the circuit shown in the figure below, and then determine the value of current (I_Z) when a total current (I) of the circuit is 0.4mA.



SECTION C (45 Marks)

Answer **three (3)** questions in this section

11. (a) (i) What will happen if one of the components of the LC tuner circuit of a radio receiver is defective?

   (ii) Show how an inductor and a variable capacitor are connected to form a parallel resonance circuit.

   (iii) From the circuit drawn in, sketch its response curve.

   (b) A parallel resonance circuit consists of a 500 pF capacitor and an inductor of 100 mH with resistance of 2 Ω. Determine;

   (i) The value of frequency at which circuit will resonate

   (ii) The circuit impedance at resonance.

12. (a) What is the importance of the features used in TV signal transmission and reception?

(i) Blanking. (ii) TV receiver compatibility. (iii) Negative vision modulation. (iv) Aspect ratio.

(b) A TV receiver is tuned to one of the TV channels. The radiated vision carrier is at a frequency of 799.25 MHz. If the picture intermediate frequency is maintained at a frequency of 39.5MHz, determine:

i) The frequency of the local oscillator.
ii) The frequency of the sound carrier when it is placed is 6 MHz above the picture carrier.
iii) The intermediate frequency of the sound carrier.

13. (a) Three elements of a Yagi-Uda antenna need to be designed to operate at 150 MHz. Calculate:

i) Length of driven element
ii) Length of director element.
iii) Length of reflector element.

(b) Draw a three elements Yagi antenna with the following specifications:

i) Length of unfolded driven element = 3cm
ii) Length of director element = 5 cm
iii) Length of reflector element = 7cm
iv) Feeder line and the support bar must be clearly shown

14. (a) Show how two NPN transistors are connected in Darlington pair with an input resistor R_B and a supply voltage of $+V_{cc}$ .Indicate the direction of collector current (I_e), emitter current (I_b).

(b) The figure below is an amplifier which produce a peak to peak sine wave output of 8V with an average d.c power of 1.6W. Study it carefully and then answer the questions that follow:

i) Calculate the r.m.s signal voltage.

ii) Find the amplifier output power.

iii) Determine the circuit efficiency.