THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

083 RADIO AND TELEVISION SERVICING
(For Both School and Private Candidates)

Time: 3 Hours **14 November 2001 p.m.**

Instructions

1. This paper consists of sections A, B and C.
2. Answer **ALL** questions in sections A and B and any **THREE (3)** questions from section C.
3. Write your Examination Number on every page of your answer booklet(s).

This paper consists of 4 printed pages.

SECTION A (10 marks)

Answer **ALL** questions in this section.

1. For each of the items (i) - (x) choose the correct answer from among the given alternatives and write its letter beside the item number.

(i) An electric conductor is a material

A which readily permits the flow of current
B in which no appreciable current will flow
C whose property of permitting flow of electrons and holes is very small
D which allows flow of holes only
E which does not allow flow of holes.

(ii) A device which allows flow of current in an open circuit without obeying Ohm's law is called

(a) capacitor
(b) variable resistor
(c) variac
(d) transistor
(e) thyristor.

(iii) A rectifier is a circuit which converts

A alternating current to direct current
B direct current to alternating current
C apparent power to real power
D solar power to electric power
E mechanical energy to electrical energy.

(iv) Micro-farad is a unit of

(a) power
(b) capacitance
(c) voltage
(d) charge
(e) resistance.

(v) The function of the zener diode is

A to set reference voltage
B to control a.c power
C the same as that of a voltmeter
D the same as that of a p-n junction
E to measure light intensity.

(vi) In rectifier circuits the

A function of π (Pi) filter is to eliminate the ripple voltage
B diodes are used to amplify the input signal
C diodes conduct in both directions
D π (Pi) filter has three capacitors
E π (Pi) filter has a capacitor, a resistor and a choke.

(vii) A transducer is

A a device that converts variations in a physical quantity into an electrical signal
B a small d.c machine
C an amplifier
D a radio aid to detection and ranging
E an aerial.

(viii) Complementary push-pull amplifier

A uses four transistors
B uses one npn transistor and one pnp transistor
C uses one transformer and one diode
D has high frequency amplification
E is used in inverter circuit.

(ix) The bipolar junction transistor

A has two junctions
B has both holes and electrons participating in the injection process
C is made of silicon semiconductor material only
D is the same as a.c diode
E is the same as magnetic amplifier.

(x) An oscillator is

A a tuned amplifier whereby some of the output energy is fed back to the input to sustain the output
B an intermediated frequency amplifier in a radio receiver
C a frequency modulator circuit
D not a circuit in electronics
E an antenna.

SECTION B (30 marks)

Answer **ALL** questions in this section.

2. Sketch the output characteristics of a BJT connected in a common emitter and indicate the three important regions.

3. Two capacitors c_1 and c_2 are connected in parallel. Prove that the joint capacitance is the sum of the individual capacitances.

4. How must the two p-n junctions of a BJT be biased for proper transistor operation?

5. Write down the equation relating the wavelength and frequency of a radio wave.

6. List down three tools used in radio servicing.

7. (a) What is modulation as applied in radio transmitter?

   (b) What is the difference between amplitude modulation and frequency modulation?

8. A secondary cell has an emf of 5 V and an internal resistance of 5-ohms. A load R_L is connected across the cell. Find the value of R_L for maximum power transfer.

9. In a radio receiver, a diode or transistor is used in the detector circuit. Why?

10. What is the load of the power amplifier in a radio receiver?

11. Explain in brief the difference between a transformer and a choke.

SECTION C (60 marks)

Answer **THREE (3)** questions from this section.

12. (a) Explain how the avalanche breakdown occurs in a reverse biased p-n junction.
(b) Explain briefly the difference between a p-n junction and a bipolar junction transistor.

13. A transistor has three terminals. It is required to be connected in a circuit which has two input terminals and two output terminals. Explain how to get four terminals from three.

14. A simple transistor amplifier connected in common emmitter configuration has a supply + V_{cc}, collector resistor R_c, base resistor R_b, collector current I_c and collector-emmitter voltage V_{CE}.

(a) Is the transistor pnp or npn?
(b) Draw the circuit diagram of the amplifier.
(c) Calculate the power dissipated in the transistor.

15. (a) Why is interlaced scanning used in a television?
(b) Colour television picture tubes always have three electron beams. Give reasons.

16. (a) Someone brings you a transistor radio receiver to fix. The output is very distorted and the volume is low. The distortion is worse when you increase the volume (turn the sound up). What would you look for first?
(b) How would you set the removal of a printed circuit mounted relay from the PCB? This component has five terminals, all soldered through the PCB.