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 **Friday November 12, 2004 p.m.**

Instructions

1. This paper consists of sections A, B and C.
2. Answer **all** questions in sections A and B and **three (3)** questions from section C.
3. Electronic calculators are **not** allowed in the examination room.
4. Cellular phones are **not** allowed in the examination room.
5. Write your **Examination Number** on every page of your answer booklet(s).

This paper consists of 4 printed pages.

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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) Arsenic, antimony, and phosphorus are all

A pentavalent
B tetravalent
C trivalent
D acceptor
E heavy electron in their orbits.

(ii) The relationship between α and β is given by

A $\beta = \frac{\alpha}{1+\alpha}$
B $\beta = \alpha(1-\alpha)$
C $\alpha = \frac{\beta}{1+\beta}$
D $\alpha = 1+\beta$
E $\beta = \frac{\beta-\alpha}{\beta}$

(iii) A_V is called the

A loop gain
B gain with feedback
C feedback factor
D gain without feedback
E power gain.

(iv) The function of a diode is

A to activate signals
B to convert the a.c. to d.c. to the large input waveform
C for rectification
D to store electric energy
E to control the flow of current.

(v) A full-wave, bi-phase rectifier employs a transformer whose secondary is 300-0-300 V r.m.s. If the circuit is feeding a load resistance of 135 kΩ the average output current is

A 2 mA
B 1 mA
C 1.414 mA
D 2.828 mA
E 10 mA.

(vi) Magnetic deflection is used in TV picture tubes

A because the coils occupy less space than the plates used for electrostatic
B to make possible the very wide angle deflection required
C because of the high scanning frequency
D because better picture quality is possible
E because of the simplicity of the method

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(vii) Micro-farad is a unit of

A power
B capacitance
C voltage
D charge
E resistance

(viii) The device which controls the flow of current is called

A current
B resistor
C capacitor
D inductor
E zenner.

(ix) 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 intermediate frequency amplifier in a radio receiver
C a frequency modulator circuit
D not a circuit in electron
E an antenna.

(x) Which of the following equations is true when the transistor is operating normally?

A $I_E = I_C + I_B$
B $I_C = I_E + I_B$
C $I_B = I_C + I_E$
D $I_E = I_B - I_C$
E $I_B = I_C$.

SECTION B (30 marks)

Answer **all** questions in this section.

2. Define gain as applied to amplifiers.

3. Draw on the same axis, choosing suitable scales, typical characteristics for silicon and germanium diodes.

4. State **three (3)** uses of r.f. oscillators.

5. State **three (3)** advantages of using integrated circuits over discrete component circuits.

6. State **three (3)** ways in which radio waves travel.

7. Explain briefly the terms a.g.c. and a.f.c.

8. Explain with the help of a diagram the term "side frequencies" in A.M.

9. State **two (2)** ways of using a variable resistor.

10. What value of capacitance would give a resistance of 50 Ω at 700 Hz?

11. Distinguish between choke and capacitor in operation.

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SECTION C (60 marks)

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

12. (a) What is an image frequency?

(b) How can the second-channel interference be minimized?

(c) A superhet radio receiver has an intermediate frequency of 470 kHz and is tuned to 1065 kHz. Calculate the

(i) Frequency of the local oscillator

(ii) Frequency of the image.

13. (a) Define the term feedback

(b) Draw a well-labelled block diagram just to show the feedback loop

(c) A wide-band amplifier has gain of (-1000) without feedback and (-20) with negative feedback. Find the

(i) Value of β

(ii) Percentage reduced in gain with the gain without feedback falls by 40 percent.

14. (a) Name **two (2)** applications of a zenner diode

(b) Draw a simple half wave rectifier with a reservoir capacitor and then draw its output waveform

(c) If zenner diode has 500 mW with breakdown voltage of 5.1 V,

(i) what will its maximum current be?

(ii) find resistance R if the maximum voltage of 3.6 V is e dropped across R.

15. Define the following terms used in T.V

(a) T.V. camera

(b) Chroma

(c) Phosphor

(d) Field

(e) Scanning.

16. (a) (i) What is alignment in radio receiver servicing?

(ii) State **three (3)** tuneable sections during radio alignment.

(b) Your radio receiver is completely dead (i.e. no sound at the output). Before taking any action for repair, what do you suspect to be the possible **two (2)** problems?

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