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 2002 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. Cellular phones are not allowed in the examination room.
4. Electronic calculators 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.

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 flow of current
B which allows flow of holes only
C which does not allow flow of holes only
D in which no appreciable current will flow
E which allows free flow of neutrons.

(ii) Microfarad is the unit of

A energy
B power
C current
D capacitance
E inductance.

(iii) The function of a diode is

A to set reference voltage
B to control a.c. power
C the rectification of a.c. to d.c. voltage
D the same as that of a p-n junction
E to set the initial current.

(iv) An electronic oscillator

A needs an external input
B provides its own input
C is nothing but an amplifier
D is just a dc/ac converter
E adjusts the input current.

(v) ACE amplifier is characterised by

A low voltage gain
B moderate power gain
C signal phase reversal
D very high output impedance
E high voltage gain.

(vi) Feedback in an amplifier always helps to

A control its output
B increase its gain
C decrease its input impedance
D stabilise its gain
E sustain the input.

(vii) The class – C amplifier is mainly used

A as an RF amplifier
B as stereo amplifier
C in communication sound equipment
D as distortion generator
E as audio amplifier.

(viii) The smallest of the four h-parameters of a transistor is

A h_i
B h_f
C h_o
D h_r
E v_c

(ix) The current amplification factor alpha dc (αdc) is give by

A I_c/I_E
B I_c/I_B
C I_B/I_E
D I_B/I_c
E I_E/I_c.

(x) In the case of a junction bipolar transistor, α is

A positive and >1
B positive and <1
C negative and >1
D negative and <1
E negative and >‖.

SECTION B (30 Marks)

Answer ALL questions in this section.

2. Write down the equation relating the wavelength and frequency of a radio wave.
3. Write down the equations relating three capacitors; C_1, C_2 and C_3 which are connected in

(a) parallel
(b) series.

4. Sketch the output characteristics of BJT connected in a common-emitter.
5. Explain the function of an oscillator.
6. Name and explain two main groups of oscillator circuits commonly in application.
7. What is the application of a feedback in an amplifier?
8. State the advantages of negative feedback.
9. Name applications of direct-coupled amplifier.
10. State the characteristics of a CC amplifier.
11. A secondary cell has an emf of 12 V and an internal resistance of 5 Ω. A load R_L is connected across the cell. Find the value of R_L for maximum transfer.

SECTION C (60 marks)

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

12. In a negative feedback amplifier, $A = 100$, $\beta = 0.04$ and $V_i = 50$ mV. Calculate the

(a) gain with feedback
(b) output voltage
(c) feedback factor
(d) feedback voltage.

13. Calculate the input and output resistances, overall current, voltage and power gains for a CE connected transistor having the following r-parameters:

$r_b = 30\ \Omega$, $r_e = 400\ \Omega$, $r_c = 0.75\ M\Omega$, $\alpha = 0.95$, $R_L = 10\ k\Omega$ and $R_s = 400\ \Omega$

14. A tuned – collector oscillator has a fixed inductance of 100 μH and has to be tunable over the frequency band of 500 kHz to 1500 kHz. Find the range of variable capacitor to be used.

15. A single- phase half-wave rectifier supplies power to a 1000 Ω load. The sinusoidal ac supply has an rms value of 200 V. The step-down transformer has a turn ratio $N_1/N_2 = 10$. Neglecting forward resistance of the diode, calculate the d.c. voltage across the load.

16. (a) Name two applications of zener diode.

(b) A 24 V, 600 mW zener diode is to be used for providing a 24 V stabilised supply to a variable load. If input voltage is 32 V, calculate

(i) series resistance R required

(ii) diode current when load resistance is 1200 Ω.