THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATIONS COUNCIL

CERTIFICATE OF SECONDARY EDUCATION EXAMINATION, 1991

083   ELECTRONICS AND RADIO REPAIR

TIME: 3.00 Hours

1. This paper consists of three sections, A, B and C.

2. There are five (5) questions in A, four (4) questions in section B
    and four (4) questions in section C.

3. Attempt ten (10) questions, four (4) questions from section A,
    three (3) questions from section B and three (3) questions
    from section C.

This paper consists of   4   printed pages.

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1. (a) Why is modulation necessary for transmission of intelligence?

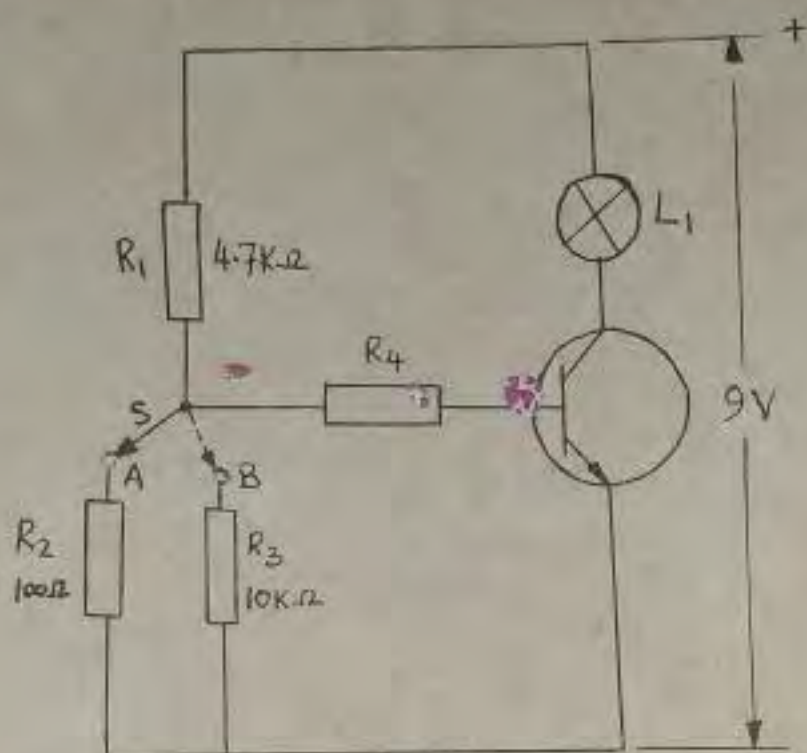   (b) What frequencies in the amplitude modulated wave contain intelligence?

2.

Fig. 1.

   (a) In Fig. 1, the lamp L_1 will illuminate when S is set to one position and not illuminate when S is set to another position.

   On which position of S will the lamp:

   (i) illuminate

   (ii) not illuminate? Give reasons.

   (b) What is the function of R_4?

3. (a) Distinguish audio signals from radio signals.

   (b) What TWO factors make up a radio wave?

   (c) Name THREE applications of radio waves.

   (d) A sinewave has a periodic time of 5µs(microseconds) at a peak value of 5mV(millivolts). What is its frequency and r.m.s. value?

4. (i) What is an electronic oscillator?

   (ii) Name two types of L-C. oscillators

   (iii) Where is the oscillator positioned in a superheat receiver?

   (iv) Draw a well labelled block-diagram of an oscillator.

* (v) Draw a simplified circuit diagram of a self-oscillating mixer employing a transistor. Label the biasing elements, the tank circuit and the tuned circuit.

5. (a) Two resistors R_1 and R_2 are connected in series. Calculate the total resistance when the values of R_1 and R_2 are given in colour codes as shown in table 1.

Resistor	1st Ring	2nd Ring	3rd Ring
R_1	Red	Violet	Orange
R_2	Blue	Grey	Red

Table 1

(b) Two values of some resistors printed on the body are shown below. Determine the value of each resistor.

    (i) 5 R 6

    (ii) 2 K 2

    (iii) 4 M 7

(c) Briefly explain the meaning of Power rating in resistors.

SECTION B

6. *Resistors used for volume and tone controls are either logarithmic or linear. Use characteristic curves to explain what these terms mean.
What are the resistors usually called?

7. *A radio receiver is brought to you with incorrect dial indication problem. Name five possible causes of the problem.

8. (a) Draw a bridge rectifier with a capacitor input filter circuit.

(b) Show by arrow heads the current flow around the bridge.

9. What do the following terms mean?
    (i) Fidelity
    (ii) Sensitivity
    (iii) Selectivity

SECTION A

10. (a) State the functions of the ignition system used in cars.

    (b) Sketch a labelled circuit diagram of the ignition coil.

    (c) Estimate the range of voltages produced by the ignition coil.

    (d) What is the standard number of turns on the secondary and primary sides of the ignition coil?

11. (a) What type of motor is used as the starter motor in cars?

    (b) Sketch a circuit diagram of the starter motor. In your diagram show the armature and the field windings.

    (c) What are the functions of a starter motor in a motor vehicle?

12. (a) Draw a circuit diagram of a simple 12 volt battery charger using a half-wave rectifier. In your diagram include a switch and an ammeter to measure the charging current.

    (b) A 12 volts battery has 6 cells. Each cell has an internal resistance of 0.01 ohms. If the charger output voltage is 12.6 volts, calculate the initial charging current.

13. (a) The lead acid battery uses dilute sulphuric acid as the electrolyte. Give the chemical equation when the battery is

    (i) fully charged

    (ii) completely discharged.

    (b) A 12 volts car battery is supplying two lamps. Each lamp is rated at 30 watts: Calculate the:-

    (i) Current drawn from the battery when the lamps are in parallel.

    (ii) Resistance of each lamp.