

# BAE 604 Telecommunication Engineering

## Test

Q1.

Two resistors  $5\text{ k}\Omega$  and  $20\text{ k}\Omega$  are at  $29^\circ\text{C}$ . Calculate for a  $10\text{ kHz}$  bandwidth, the thermal noise power and voltage (a) for each resistor (b) for their series combination (c) for their parallel combination

Q2.

Pb A three stage amplifier has a  $3\text{ dB}$  bandwidth of  $200\text{ kHz}$  determined by an LC tuned circuit at its input. and operates at  $22^\circ\text{C}$ . The first stage has a power gain of  $14\text{ dB}$  and NF of  $3\text{ dB}$ . The second and third stages are identical with power gains of  $20\text{ dB}$  and  $\text{NF} = 8\text{ dB}$ . The output load is  $300\Omega$ . The input noise is generated by a  $10\text{ k}\Omega$  resistor. Calculate (a) the noise voltage and power at the input and the output of this system (b) overall noise figure (c) actual output noise and power

Q3

Pb A TRF receiver is to be designed with a single tuned circuit using a  $10\mu\text{H}$  inductor. (a) Calculate the capacitance range of the variable capacitor required to tune from  $550$  to  $1550\text{ kHz}$ . (b) The ideal  $10\text{ kHz}$  BW is to occur at  $1100\text{ kHz}$ . Determine the required 'Q' (c) Calculate the B.W of this receiver at  $550\text{ kHz}$  and  $1550\text{ kHz}$

Q4

Pb An FM signal  $2000 \sin(2\pi \times 10^8 t + 2 \sin \pi \times 10^4 t)$  is applied to a  $50\Omega$  antenna. Determine (a) the carrier frequency (b) the transmitted power (c) m.f (d)  $f_i$  (e) BW by two methods (f) power in the largest and smallest side band

Q5

Pb AN AM BROADCAST RECEIVER HAS TWO IDENTICAL TUNED CIRCUITS<sup>11</sup>. THE 'Q' OF THESE CIRCUITS IS 60 AND THE IF FREQUENCY IS 455 KHZ. THE RECEIVER IS TUNED TO A STATION AT 680 KHZ - CALCULATE THE AMOUNT OF FREQUENCY REJECTION.

Q6

THE 24 dB GAIN PRE-AMP IS REPLACED WITH 0 dB<sup>19</sup> GAIN PRE-AMP WITH THE SAME SdB NF. WHAT IS THE SYSTEM'S SENSITIVITY AND DYNAMIC RANGE?

Q7. Explain PCM/TDM repeater

Q8. Explain code transmission.

Q9.

Pb DETERMINE THE AMOUNT OF DELAY AND THE VELOCITY OF PROPAGATION. INTRODUCED BY A 1 ft SECTION OF RG 8A/U COAXIAL CABLE USED AS A DELAY TIME

Q10

Pb A RECEIVER HAS A 20 dB NOISE FIGURE (NF), A 1 MHz<sup>12</sup> BANDWIDTH, A +5 dBm THIRD ORDER INTERCEPT POINT AND A 0 dB S/N. DETERMINE IT'S SENSITIVITY AND DYNAMIC RANGE.