      FRIENDLY CORRESPONDENCE COURSE
for the
      RADIO AMATEUR EXAMINATION

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7.1
       The 1000 Ohm (not 1000 kOhm) is the emitter resistor. It will prevent
excessive currents flowing through the transistor. It does this in two ways.
Firstly by affecting the bias voltage and secondly by limiting (by Ohms Law) the
maximum current that could flow.
 For the RAE we will concentrate on the latter.
Let us assume that the collector resistor is 5k
If the transistor were "fully turned on" it would have a very low internal
resistance between collector and emitter. We will assume this is zero Ohms.
If the details of the transistor state that "the maximum collector and emitter
current is 1.5 mA" then we calculate as follows:
The supply is 9.0 Volts.
The maximum current is 1.5 mA
Using Ohms Law:
            $R = V/I = 9/ 0.0015 = 6000$ Ohms
As the collector resistor is 5000 Ohms then the emitter resistor will be 1000
Ohms (6000-5000=1000)
This may be beyond the requirements of the RAE

7.2
     As this is a low frequency amplifier (speech) the capacitors will have to
be quite large so that that they have suitably low reactance. C1 would be in the
range 0.1 F to 10 F and C2 in the range of about 10 F to 250 F

7.3
     The circuit is a two stage audio amplifier. The signal is amplified in two
stages. It is amplified by the first transistor and the result is then further
amplified by the second transistor. In order that the signal is not distorted,
both the audio transistors will be biassed in class A.

7.4
     In shared or secondary Amateur Bands the amateur must be able to react to
Morse transmissions made by Primary or other users. They could be dealing with a
real emergency.
World wide radio regulations require that users of "non type approved equipment"
(this includes amateurs) below 30 MHz must be qualified in Morse communication.

7.5
HF is from 3 to 30 MHz, VHF is from 30 to 300 MHz and UHF is from 300 to 3000MHz
The "Four Metre" amateur Band is from 70.025 to 70.5 MHz and is therefore a **VHF**
band.

7.6
     This is a push-pull amplifier operating in Class B.
One transistor amplifiers the positive half cycles. The other transistor
amplifiers the negative half cycles.

7.7 As this is a class B amplifier there will zero collector current if there is
no input.

7.8
     There is a tuned circuit at both the input and the output of the
transistor stage.
The input circuit is tuned to the input frequency.
The transistor is biased so that the signal is distorted on purpose. This
distorted signal will contain harmonics of the input signal.
The output circuit is tuned to select the required harmonic.

7.9
     The resonant frequency
      of a tuned circuit (fo) is:

$$f_o = \frac{1}{2 \pi \sqrt{(L \times C)}}$$

     This formula applies to both
     series **and** parallel circuits.

7.10
To ensure that you operate within the Amateur Bands your equipment should be of
the required frequency accuracy.
For example, when operating within 10kHz of the band edge would require an
accuracy of 0.05%. Operation in the middle of a band may only require an
accuracy of 1%

7.11
     You should turn off the power. Then use bleed resistors to discharge high
voltage capacitors, then short them to earth while working on the equipment.

7.12
Wavelength = Speed of light or radio **divided by** frequency

$$\frac{300 \text{ Million}}{146 \text{ Million}}$$

= 2.055 MHz

7.13
The 21 MHz amateur Band goes up to 21.45 MHz

7.14
     Many people have ex World War Two valve receivers. They are often as sensitive as modern transistor receivers but will lack stability.
 IE It takes some time for the oscillators to stop drifting.

I hope these answers are helpful   73 Pete Pennington

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