FIJI NATIONAL UNIVERSITY

COLLEGE OF ENGINEERING SCIENCE & TECHNOLOGY
School of Electrical & Electronics Engineering

FINAL EXAMINATION-TRIMESTER 3-2015

EEE424 RADIO RECEIVERS & TRANSMITTERS

CERTIFICATE IV IN ELECTRONIC ENGINEERING

DAY/TIME : Wednesday, 9th Dec . **TIME :** 9.00am-11am

Pages 1 to 8

INSTRUCTIONS TO STUDENTS

1. **You are allowed 10 minutes EXTRA time during which you are not to write.**
2. **Write your candidate number on the top of each sheet of the answer booklet.**
3. **Write all your answers in the ANSWER BOOKLET provided.**
4. **For all sheet of papers on which rough/draft work has been done, cross it through and attach these to your answer script.**
5. **There are SEVEN QUESTIONS worth a total of 120 MARKS.**
6. **Attempt all questions**

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Q1-Complete each of this statement by filling the blank with the correct word or number? Write the answer beside the question number in your answer sheet?

1	In vacuum tube work the pentode is an improvement over the _____
2	Like the tetrode the _____ has an amplification factor
3	The _____ as the name implies is a five-element tube employing the four elements of the tetrode plus and additional grid
4	The additional grid in question 3 above is called _____ grid
5	A vacuum tube rectifier is called _____
6	The diode is a two-elements tube commonly used in _____
7	The _____ is the part of vacuum tubes used in all types of vacuum tubes which consists of _____ and cathode
8	The _____ is a vacuum tube that has three active elements
9	The _____ diode is frequently used for generating microwave RF signal
10	TEA or transferred electron amplifiers is a type where _____ diodes are used
11	The gunn diode does not make use of _____ junction diode
12	Another name of a varactor diode is _____
13	Varicap diode makes use of PN junction when its _____biased
14	A tuned circuit consists of the two components called _____ __ and _____
15	The opposition of an inductance to the flow of AC (alternating current) is called the _____ denoted by _____
16	The opposition of a capacitor to the flow of AC (alternating current) is called the _____ denoted by _____
17	An oscillator which makes use of a crystal is well known for its frequency _____
18	The purpose of AGC used in a radio receiver is to produce a _____
19	The _____ is a high powered vacuum tube that works as self-excited microwave oscillator
20	A low pass filter only allows frequencies lower than the _____ frequency
21	A high pass filter allows frequencies higher that the _____ frequency

25 marks

Q2- Write the letter T if the statement is true and the letter F if its false ?

1	The equivalent circuit of a crystal if drawn will consist of the symbol representing a coil, a resistance and a capacitor.
2	The tunnel diode was invented in August 1957 by Leo Esaki .
3	In CB transceivers a sample of the output signal from the modulation transformer goes to the ALC circuit which adjust the gain of the microphone preamplifier to keep the audio output relatively constant
4	An AGC circuit is feeding a sample of the output back to the input to keep the overall output of a radio receiver constant
5	An AFC circuit is useful when an oscillator drifts from its required frequency
6	A tunnel diode is not a type of semiconductor that is capable of very fast operation, well into the microwave frequency region
7	VCO is not required to be used in PLL circuit
8	A disadvantage of the phase locked loop circuit is its necessity to use a transformer
9	SAW is an integrated device active device with bandpass filter characteristics
10	Comb filter exists in two different form namely Feedforward and Feedback
11	A simple Tuning Circuit of radio receiver consists of L and C circuit
12	Remote tuning of required radio station has been possible because of the nature of varicap
13	In the tank circuit the required frequency is selected by arranging the value of L and C to resonate at the wanted frequency
14	The input of a phase Locked Loop Circuit is fed into the phase detector and its output is taken out from the voltage control oscillator.
15	In any radio receiver the antenna is usually connected to the input of a mixer
16	The input of a radio receiver is the electromagnetic waves
17	The output of a radio receiver is the electrical wave
18	In a complete radio system the two subsystems are transmitter and receiver
19	The input of the transmitter is the audio
20	The output device of the radio transmitter is the loudspeaker
	20 marks

Q 3-Match the term on the LHS to its meaning in the RHS. Write the letter representing the correct term beside the question number on your answer sheet?

	LHS	ANS	RHS	
1	Condition for varactor diode to operate		Tx antenna	A
2	Channel 18 of the citizen band		Doubler	B
3	Input to the transmitter of transceiver		Electromagnetic wave	C
4	Output device of transceiver in transmit mode		Antenna	D
5	Input of transceiver in Rx mode		27.175 MHz	E
6	A device common to receiver and transmitter		Loudspeaker	F
7	Microphone of transceiver usually connected to		Sound	G
8	Usually connected to the mixer in a radio receiver		Audio Preamp	H
9	Connect to output of oscillator of a transceiver		RF amplifier output	I
10	Output device of transceiver in Receive mode		Reversed bias	J
11	Usually connected to the output of a mixer in Rx		IF amplifier	K
12	A circuit to prevent overmodulation in transceiver		Sensitivity	L
13	Usually connected to input of a Phase Locke3d Loop Circuit		IF AMP 1	M
14	A circuit to separate audio from RF modulated wave		VCO	N
15	Can be Used for matching coaxial cable to Rx input		Microphone	O
16	The component usually adjusted in IF alignment		Demodulator	P
17	Can have three stages or more in a radio receiver		Phase detector	Q
18	Usually at utput of PLL circuit		Balun	R
19	Ability of receiver to receive weak signal		Coil	S
20	The input device when a transceiver is in Tx mode		ALC	T
	20 marks			

Q 4-Shown below are diagrams for you to analyze and select the circuit which utilize a diode and ;

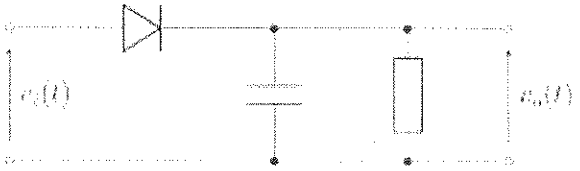
(i) Draw on your answer sheet 2m

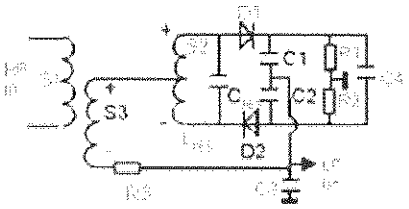
(ii) Name the circuit 2m

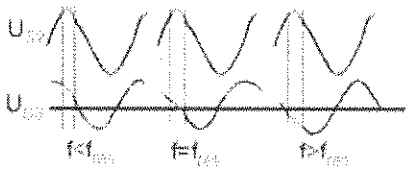
(iii) State the equipment in which the circuit you have selected will be used ? 2m

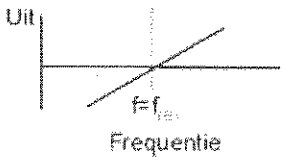
(iv) Name the waveform at the input and the output 4m

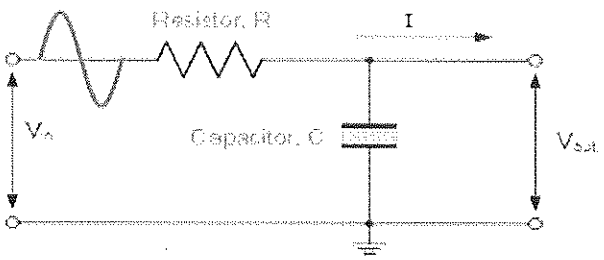
(v) Describe how each component is used in order for the circuit to achieve its purpose ? 5m







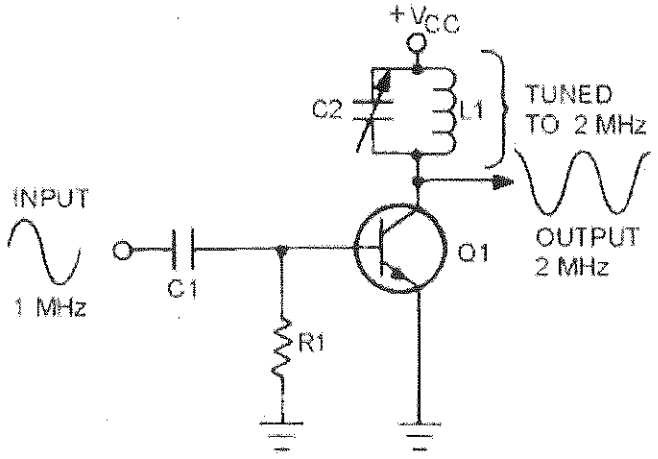




15 marks 80

Q 5- (a) Name and describe the operation of this circuit including a brief explanation of how and where it could be used ? 5 m

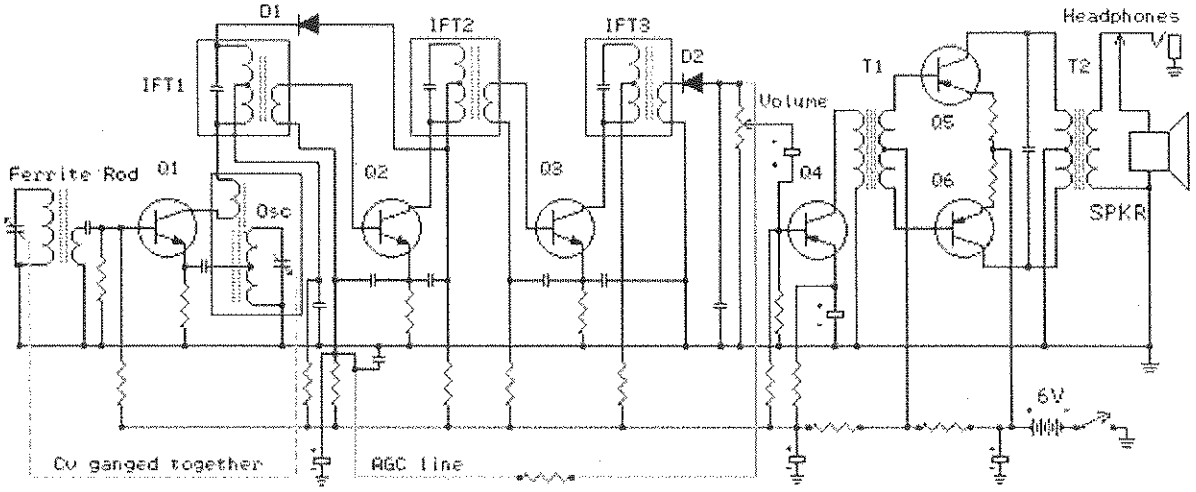
(b) If C2= 2200 microfarads ; calculate the value of L1 ? 5 m



10 marks 90

Q6 – Refer to the diagram below and answer the questions that follow;

1. State the name of this circuit ? **(1 mark)**
2. Draw the block diagram of the circuit and clearly label each block ? **(4 marks)**
3. Describe the type of modulation the circuit is useful for ? **(1 mark)**
4. Briefly explain the function of diode D2 ? **(2 marks)**
5. What is the type of power amplifier used ? **(1 mark)**
6. What happens to the sound on the speaker when one listens to the headphone ? State the reason ? **(1 mark)**



10 marks$_{100}$

Q7 (a) Define the term modulation ? 3m

(b.) Name the circuit below apart from RF POWER AMPLIFIER ? 1m

(a) Analyze the diagram below Figure 3 and answer the questions that follow ?

(i) How many input and output to the circuit ? 3m

(ii) State the difference of the inputs ? 2m

(iii) Briefly explain the function of the circuit including the waveform at the part of the cct marked A, B & C ? 6m

(iv) State the device that should be connected to the input and why ? 2m

(v) State with reasons the device that should be connected to the output ? 3m

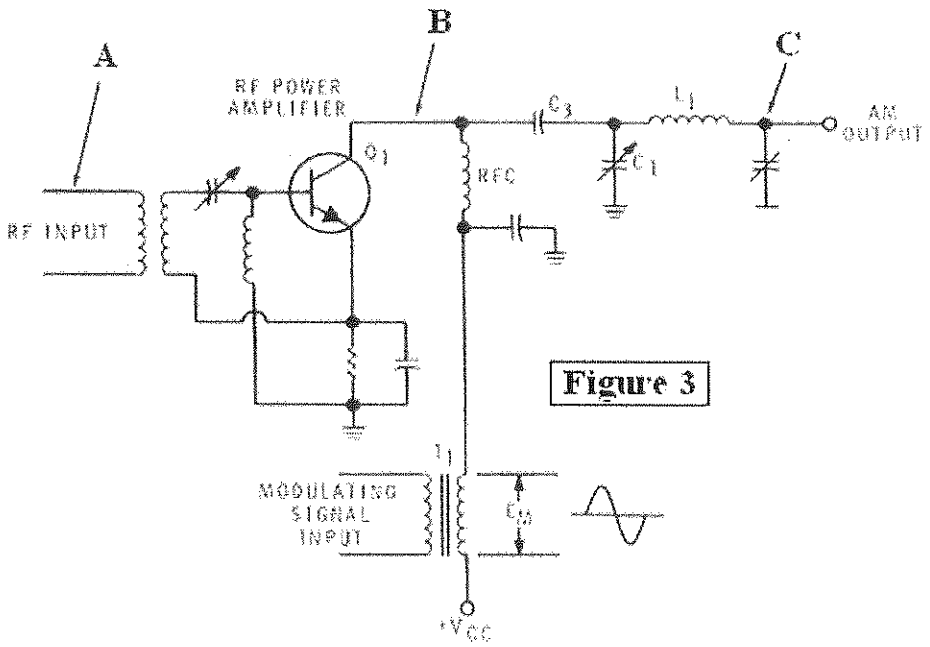


Figure 3

15 marks$_{120}$

TOTAL MARKS = 120

THE END