# KENYA AERONAUTICAL COLLEGE

**DIPLOMA IN AERONAUTICAL ENGINEERING**

**YEAR 3, TERM 1**

**TELECOMMUNICATIONS**

**DIP 08M.**

**END TERM**

**NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**DATE: November 13, 2012 TIME: 3 HOURS**

**STARTING TIME: 0800 HRS**

**Instructions:**

* Attempt all the questions

1. (a) Draw a labeled diagram of phasing methods of a single sideband band transmitter

and describe its operation. **(8marks)**

(b) A modulating single of V=15sin 200volts is used to frequency modulation a

carrier wave of 12MHz, 5 volts amplitude. Derive an expression for the modulated signal **(5 marks)**

(c) (i) An amplitude modulated broadcast radiates 200Kw when the modulation

index is 0.8. Calculate the side band power if modulation index is increased to 0.94 **(4 marks)**

(ii) State three advantages of FM over DSB AM. **(3 marks)**

1. (a) Describe the “capture effect “as applied to FM systems **(4 marks)**

(b) The terminal currents and voltages of a BJT transistor can be given by the expression ;



With the aid of a four terminal block diagram define the h-parameter for this transistor **(8 marks)**

(c) A common emitter amplifier has a collector load of 2kΩ. if hie=800Ω, hoe=50x10-65, and hfe=55. Determine

1. Voltage gain
2. Power gain
3. The percent error in power gain if hoe is neglected **(10 marks)**
4. (a) Differentiate between the following terms

Negative feedback and positive feedback **(4 marks)**

(b) With the aid of block diagram show that the feedback gain is given by

 **(8 marks)**

(c) (i) State FOUR advantages of negative (-ve) feedback **(4 marks**)

(ii) Briefly describe the effect of negative feedback on the amplifierS

(**4 marks)**

The fig. 4(i) shows a two stagger tuned voltage amplifier. Describe its operation using well labeled curves of the frequency response

(b) A parallel resonant circuit consists of a capacitor of 100pF and an inductor of 100mH. The inductor has a resistance of 5Ω. Find the value of the frequency at which the circuit will resonate and the circuit impedance at resonance **(6 marks)**

(c) (i) Describe the meaning of a tuned voltage amplifier

(ii) Derive an expression for the resonance frequency of a parallel resonant circuit **(6 marks)**

1. (a) (i) Identify any FOUR characteristics of class A power amplifier**(2 marks)**

(ii) Prove that the overall and collector efficiency of class A amplifier 0.5=50% **(6 marks)**

(b) With the aid of well labeled circuit diagram explain the principle of operation of a transformer coupled class-B push-pull amplifier **(8 marks)**

(c) A class–B push-pull amplifier with transformer coupled load uses two transistors rated 10W each. What is the maximum power output one can obtain at the load from the circuit? **(4 marks)**