Technical University of Mombasa

Faculty of Engineering and Technology

DEPARTMENT OF MEDICAL ENGINEERING

DIPLOMA IN MEDICAL ENGINEERING
(DME 213 Y2S1)

EHL 2201
MEDICAL ELECTRONICS II

END SEMESTER EXAMINATIONS

SERIES: DECEMBER, 2013
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

-Answer question **ONE (COMPULSORY)** and any other **TWO** questions
-You should have a scientific calculator for this paper
This paper consists of **4 PRINTED** pages

QUESTION ONE (COMPULSORY)

(a) With the aid of characteristics, explain the following amplifier classifications. **(9 marks)**

(i) CLASS C
(ii) CLASS AB
(iii) CLASS B

(b) State **ONE** merit and **ONE** demerit of each of the following amplifier interstage coupling methods

(i) DC Coupling
(ii) RC Coupling
(iii) Transformer coupling**.** **(6 marks)**

(c) For the class A, CE amplifier circuit of fig 1 If Q=510 Ma. If collector i.e output current *varies by* ± 260 mA when an input signal is applied and the base, calculate.

(i) total dc. Power taken by the circuit
(ii) dc power dissipated by the collector load
(iv) ac power developed across the load
(v) power delivered to the transistor
(vi) dc power wasted in transistor collector
(vii) overall efficiency
(viii) collector efficiency **(15 marks)**

QUESTION TWO

(a) Draw a flow chart showing power contribution in a class A RC coupled amplifier. **(6 marks)**

(b) For the transformer coupled optimally-biased class –A amplifier in fig 2 find

(i) Transformer turns ratio
(ii) Collector current
(ii) Transistor power rating **(14 marks)**

QUESTION THREE

(a) (i) Draw the circuit of a transformer push-pull amplifier.
(ii) Explain the operation of the circuit in (i) above **(10 marks)**

(b) A power transistor is used in a CE amplifier meant for class- A operation. If zero signal power dissipation is 10 W and ac output power is 3.5 W, find
(i) Collector efficiency
(ii) Power rating if the transistor. **(4 marks)**

(c) An amplifier has an input signal of 16V peak to-peak and an input impedance of 320 kΩ. It gives an output voltage of 8 V peak to peak across a load resistor of 4Ω. Calculate the dB power gain of the amplifier. **(6 marks)**

QUESTION FOUR

(a) Explain the following amplifier signal distortion and the cause:

(i) Non linear distortion
(ii) Intermodulation distortion
(iii) Frequency distortion. **(6 marks)**

(b) The signal input to a small signal amplifier consists of 50μW of signal power and 0.5μW of noise power. The amplifier generates an internal noise power of 50μW and has a gain of 20dB. Calculate;

(i) Input S/N ratio
(ii) Output S/N
(iii) Noise factor
(iv) Noise figure **(14 marks)**

QUESTION FIVE

(a) Draw the power rectangle for a class A RC coupled CE connected power amplifier and indicate the following regions;

(i) Total average power supplied to the circuit by Vcc battery
(ii) Power lost as heat in the load resistor
(iii) Power delivered to transistor
(iv) a.c. power across RC (a.c. power output)
(v) Power dissipated by collector region of transistor. **(14 marks)**

(b) Draw a collector tuned single stage amplifier and its response curve. **(4 marks)**

(c) The input and output voltages of a networks are 16V and 8V respectively. If input impedances are equal, calculate the voltage gain in dB **(2 marks)**