Total No. of printed pages = 6

CAI-404/EC&D-I/4th Sem/2018/M

ELECTRONICS CIRCUITS AND DEVICES – I

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks for the questions.

PART – A

All questions are compulsory.

1. Answer the following multiple choice questions : 1×6=6

   (a) The cut-in voltage for Ge diode is approximately

   (i) 0.2V

   (ii) 0.6V

   (iii) 1.1V

   (iv) None of the above

[Turn over

(b) The width of the depletion layer of a junction

(i) decreases with light doping

(ii) increases with heavy doping

(iii) is independent of applied voltage

(iv) is increased under reverse biased.

(c) In active region operation of a transistor

(i) emitter junction is reversed bias while collector junction is forward bias

(ii) emitter junction is forward bias while collector junction is reverse bias

(iii) both junctions are reversed biased

(iv) both junctions are forward biased

(d) A JFET can operate in

(i) deplation mode only

(ii) enhancement mode only

(iii) either deplation or enhancement mode at a time

(iv) both deplation and enhancement modes simultaniously

(e) An ideal Op-Amp has CMRR

(i) Zero (ii) Small

(iii) Large (iv) Infinite

(f) A voltage follower

(i) is non-inverting

(ii) has gain one

(iii) has no feedback resistor

(iv) All of the above

2. Fill in the blanks : 1×12=12

(a) An Op-Amp is a _____ IC.

(b) Open loop gain of ideal Op-Amp is _____.

(c) The ratio of differential gain to common mode gain is _____.

(d) The base of transistor is _____ than emitter.

(e) The function of transistor is _____.

(f) The gate to source voltage that gives zero drain current in a FET is _____.

(g) When the collector current flows only during the positive half cycle of the input signal the power amplifier is _____.

(h) Overall efficiency of Class A power amplifier is _____.

(i) The oscillator is an amplifier with _____ feedback.

(j) A bistable multivibrator has _____ stable states.

(k) A circuit that generates square waves is called a _____.

(l) The JFET can operate in _____mode only.

3. State whether the following statements are true or false : 1×7=7

(a) Operating point of transistor means IC and Vbe.

(b) Power amplifier are large signal amplifiers.

(c) Audio frequency range is 20 Hz to 20 KHz.

(d) A bistable multivibrator has stable states.

(e) The frequency of oscillation of an astable multivibrator depends mainly on width of input pulse.

(f) Output resistance of ideal Op-Amp is infinity.

(g) Input impedance of MOSFET is less than FET.

PART – B

Answer any *three* questions.

1. (a) What is power amplifier ? Differentiate between voltage amplifier and power amplifier. 1+3=4

(b) Differentiate between Class A, Class B and Class C power amplifier. 3

(d) Find overall efficiency of Class A power amplifier. 5

(e) For a power amplifier working in Class A operation, the zero signal collector current is 100 mA. If d.c supply voltage Vcc=12V, determine (a) maximum a.c power output, (b) power rating of transistor, (c) maximum collector efficiency. 3

2. (a) What is oscillator ? Give the classification of oscillators based on the frequency ranges. 1+2=3

(b) State the conditions under which a feedback amplifier works as an oscillator. 2

(c) Describe Colpiits' oscillator circuit and explain its action. 7

(d) A Colpiits' oscillator is designed with C1=100 pF, C2=7500 pF and an inductor. Determine inductance value if the frequency of oscillation is 950 KHz. 3

3. (a) What is an Op-Amp ? Define CMRR. 1+2=3

(b) Describe the characteristics of an ideal Op-Amp. 4

(c) Explain the following : 2×4=8

(i) Subtractor

(ii) Integrator

4. (a) Explain the operation of N channel FET with static characteristics curve. 8

(b) Name the factors which make JFET superior to BJT. 2

(c) Write short notes on any *one* of the following : 5

(i) MOSFET

(ii) Push Pull amplifier

(iii) Multivibrator.