Total No. of printed pages = 7

END SEMESTER EXAMINATION – 2019

Semester : 4th

Subject Code : CAI-404

ELECTRONIC CIRCUITS AND DEVICES-I

Full Marks –70

Time – Three hours

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

Instructions :

1. *All* questions of PART – A are compulsory.
2. Answer any *five* questions from PART – B.

PART – A

Marks – 25

1. Fill in the blanks : 1×10=10

   (a) Highest conductivity region of transistor is _____.

   (b) Highly doped region of transistor is _____.

[Turn over

(c) At low frequency _____ oscillator is used.

(d) Power amplifiers are _____ signal amplifiers.

(e) A feedback circuit usually employs _____ network.

(f) Unity gain Op-amp is seen in _____.

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

(h) The voltage at which FET gets saturated is _____.

(i) A transistor has _____ doped regions.

(j) N-channel MOSFET is _____ than P-channel MOSFET.

2. Write true or false : 1×10=10

(a) Transistor to be in active region base-emitter is reverse bias and collector base region is forward bias.

(b) When the positive on the gate of a P-channel JFET is increased, the drain current will increase.

(c) Class A amplifier is used when minimum distortion is desired.

(d) Input resistance of ideal Op-amp is infinity.

(e) Capacitor values may change due to change in temperature.

(f) LC oscillators are variable and fixed frequency oscillators.

(g) A FET is essentially a voltage driven device.

(h) Astable multivibrator is used as voltage to frequency converter.

(i) An Op-amp is a nonlinear device.

(j) Slew rate is rate of change of maximum output voltage.

3. Choose the correct answer : 1×5=5

(a) 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.

(b) A JFET can operate in

(i) Depletion mode only

(ii) Enhancement mode only

(iii) Either depletion or enhancement mode at a time

(iv) Both depletion and enhancement modes simultaneously

(c) Negative feedback reduces distortion in an amplifier only when

(i) It is part of its output

(ii) It is generated within it

(iii) It comes as a part of input signal

(iv) It exceeds a certain safe level

(d) Operating points means

(i) IcvsVce (ii) IcvsVbe

(iii) IbvsVce (iv) IevsVce

(e) A practical Op-Amp has CMRR

(i) Zero (ii) Small

(iii) Large (iv) Infinite.

PART – B

Marks – 45

4. (a) What is the difference between diode and transistor ? 3

(b) Explain CE configuration of transistor with its output characteristics. 3

(c) Explain the following :

(i) DC load line

(ii) Different regions on the output characteristic of a transistor. 3

5. (a) Why biasing in transistor is important ? 2

(b) Explain fixed biased method of transistor. 3

(c) Find emitter current for the transistor with self-bias circuit having $\beta = 100$, $Vcc = 20V$, $R1 = 12\ K\Omega$, $R2 = 8\ K\Omega$, $Rc = 2\ K\Omega$ and $Re = 1\ K\Omega$. 4

6. (a) Differentiate between voltage amplifier and power amplifier. 4

(b) Derive the maximum collector efficiency of class A transformer coupled power amplifier. 5

7. (a) A class A power amplifier uses a transformer as a coupling device. The transformer has a turn ratio of 10 and the secondary load is 10 ohm. If the zero signal collector current is 100 mA, find the maximum power output. 3

(b) Explain push pull amplifier. 6

8. (a) What is an oscillator ? How does tank circuit helps in oscillation ? 1+2=3

(b) Describe Hartley oscillator circuit and explain its action. 6

9. (a) Explain the block diagram of Op-amp with all its stages. 4

(b) List the ideal characteristics of an Op-amp. 3

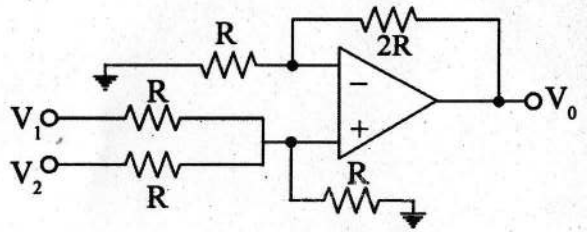
(c) Find the gain of voltage follower. 2

10. (a) Explain the following : 2+3=5

(i) Non Inverting amplifier

(ii) Summing amplifier

(b) Figure shows a non inverting Op-amp summer with V1=5V and V2=3V. Calculate the output voltage Vo. 4



11. Explain the operation of N-channel FET and draw its characteristics. 9

12. Write short notes on any *two* : 4½×2=9

(i) Transistor as an amplifier

(ii) Multivibrator

(iii) Enhancement MOSFET

(iv) Integrator Op-amp.