Total No. of printed pages = 4

CAI-404/ECD-I/4th Sem/2016/N

ELECTRONIC CIRCUITS AND DEVICES – I

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

Answer any *five* questions.

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

   (b) A resistive load of 4Ω is matched to the collector impedance of an amplifier by means of a transformer having turn ratio 40 : 1. The amplifier used a D.C supply voltage of 12V in the absence of input signal. When signal is present at the base, the collector voltage swings between 22V and 2V while the collector current swings between 0.9A and 0.05A. Determine : 5

   (i) Collector impedance

   (ii) Signal power output

[Turn over

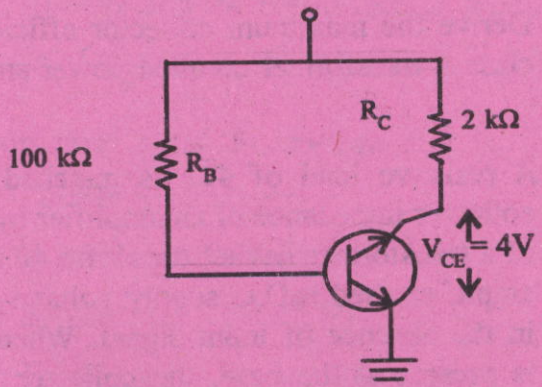
(iii) D.C power input

(iv) Collector efficiency.

(c) Differentiate between class A, B and C power amplifier. 4

2. (a) Derive the expression of input resistance, voltage gain and current gain in terms of *h* parameters of a transistor amplifier. 9

(b) Calculate I_C, I_B and stability factor for the following circuit : 5



3. (a) What is an oscillator ? How does it differ from amplifier ? 2

(b) State the Barkhausen criterion of oscillation. 2

(c) Draw the circuit diagram of a transistor Colpitt's oscillator. Explain the function of each component. 6

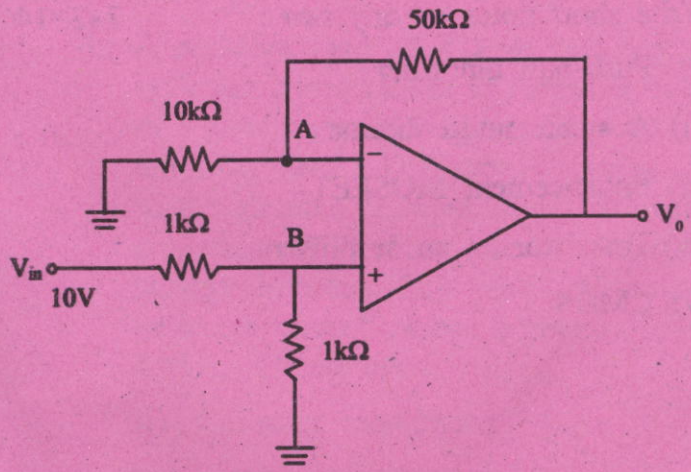
(d) A Colpitt's oscillator is designed with C_1 = 100 pF and C_2 = 7500 pF. The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 KHz and 2050 KHz. 4

4. (a) List the ideal characteristics of an Op-amp. 4

(b) What is input offset voltage ? 1

(c) What is slew rate ? Derive the slew rate equation for an Op-amp. 5

(d) Find V_0 for the circuit shown below : 4



5. (a) Explain the operation of N-channel FET and draw its characteristic. 8

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

(c) Differentiate between : 2+2=4

(i) Bipolar and unipolar device

(ii) Enhancement mode and depletion mode MOSFETs.

6. (a) Draw the circuit diagram of CMOS NOR gate and explain its operation. 6

(b) Explain the following : 4+4=8

(i) Op-amp as non-inverting amplifier

(ii) Op-amp as differentiator.

7. Write short notes on any *two* : 7×2=14

(i) Push-pull amplifier

(ii) A stable multivibrator

(iii) Enhancement MOSFET

(iv) Transistor as an amplifier

(v) CMOS.