Code: DE08 **Subject: ANALOG ELECTRONICS**
Time: 3 Hours **Max. Marks: 100**

JUNE 2011

NOTE: There are 9 Questions in all.

- **Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.**
- **The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination.**
- **Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.**
- **Any required data not explicitly given, may be suitably assumed and stated.**

Q.1 Choose the correct or the best alternative in the following: **(2×10)**

a. A transistor is said to be in quiescent stage when

(A) emitter junction bias is just equal to collector junction bias.
(B) no currents are flowing.
(C) no signal is applied to the input.
(D) it is unbiased.

b. The main component responsible for lowering of gain in an R-C coupled amplifier in low frequency range is

(A) Biasing system. **(B)** resistor R_E.
(C) Coupling capacitor C_C **(D)** transistor itself.

c. Which of the following classes of amplifiers has maximum distortion?

(A) Class A **(B)** Class B
(C) Class AB **(D)** Class C

d. Feedback in amplifier always helps in

(A) controlling its output. **(B)** increasing its gain.
(C) reducing its input impedance. **(D)** stabilizes its gain.

e. A crystal oscillator provides very stable frequency because of

(A) high stability of the crystal **(B)** the rigid crystal structure
(C) low X_L/R ratio of the crystal **(D)** high Q of the crystal

f. Stagger tuning is achieved by

(A) double tuned circuit.
(B) tuned circuits which are tuned to same frequency.
(C) tuned circuits which are tuned to slightly different frequencies.
(D) circuits tuned at harmonic frequencies.

g. In a JFET, increase in applied external bias to the gate causes

(A) decrease in size of depletion regions.
(B) increase in drain current.
(C) decrease in channel resistance.
(D) decrease in drain current to achieve pinch-off voltage.

h. Schmitt trigger is basically

(A) an astable multivibrator **(B)** a monostable multivibrator
(C) a bistable multivibrator **(D)** an oscillator

i. For faster switching action of a transistor

(A) a capacitor may be connected across the base resistance.
(B) a capacitor may be connected in series with the base resistance.
(C) a capacitor may be connected across R_E.
(D) the value of the coupling capacitor may be increased

j. The circuit shown in Fig.1 is

(A) an adder
(B) a differentiator.
(C) an integrator
(D) comparator

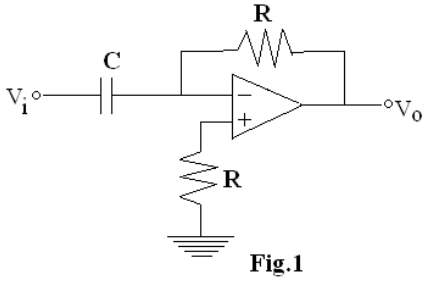


Fig.1

Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.

Q.2 a. Draw the circuit diagram of self Biasing and explain how does this circuit provides bias stabilization automatically. **(10)**

b. Calculate the operating point for the Fixed Biasing transistor circuit shown in Fig.2 and draw its dc load line. **(6)**

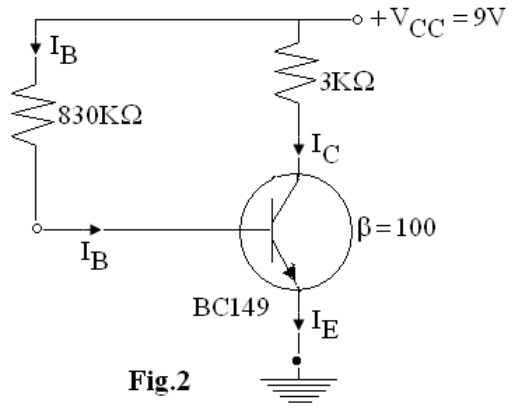


Fig.2

Q.3 a. Draw the hybrid Pi model for transistor in CE configuration at lower frequency and briefly explain the components of the model. **(9)**

b. Calculate the current gain (A_I), voltage gain (A_V) and power gain (A_P) for the common collector amplifier shown in Fig.3. The given transistor h-parameters are $h_{ic} = 1.4K\Omega$, $h_{fc} = 100$ and $h_{rc} = 20\mu A/V$. **(7)**

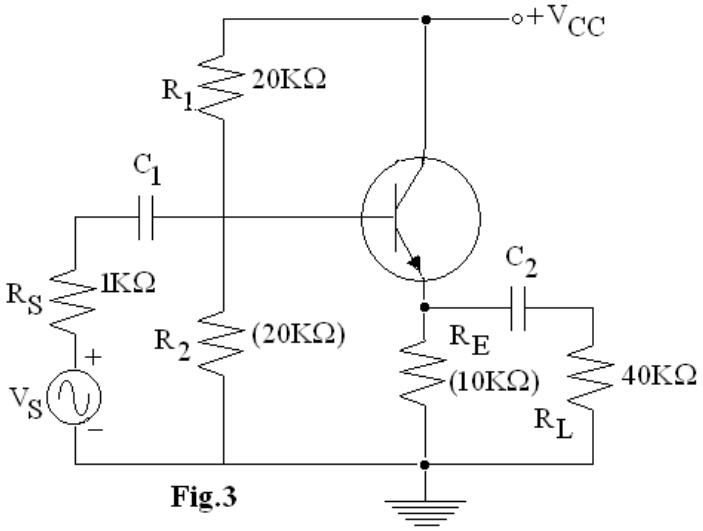


Fig.3

Q.4 a. Compare the characteristic performances of CE, CB, CC configurations with their applications. **(7)**

b. Draw the circuit diagram of single tuned voltage amplifier and explain its working. What are its limitations? **(9)**

Q.5 a. Draw the circuit of class-B Push-Pull amplifier and explain its operation with neat waveforms. **(10)**

b. A transformer-coupled class-A Power amplifier draws a current of 200 mA from a collector supply of 10V, when no signal is applied to it. Determine

(i) Maximum output power, P_{out}

(ii) DC power input, P_{in}

(iii) Maximum collector efficiency, η_{max} **(6)**

Q.6 a. What is an oscillator? Draw the circuit diagram of RC-phase shift oscillator using BJT and explain its operation. Mention its applications. **(10)**

b. The R-C circuit of a Wein-bridge oscillator consists of $R_1 = R_2 = 220K\Omega$ and $C_1 = C_2 = 250PF$. Determine the frequency of oscillation. **(6)**

Q.7 a. Draw the circuit of zero-crossing detector using Op-Amp and explain its operation with the help of input and output waveforms. **(8)**

b. An Op-Amp inverting amplifier has $R_f = 500K\Omega$ and $R_1 = 5K\Omega$. Determine its

(i) Voltage gain (A_v)

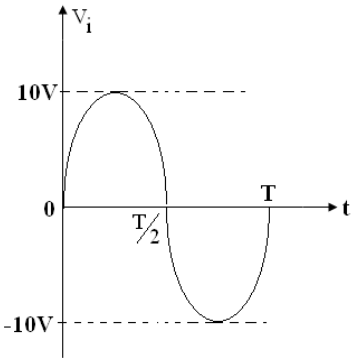
(ii) Input resistance (R_{in})

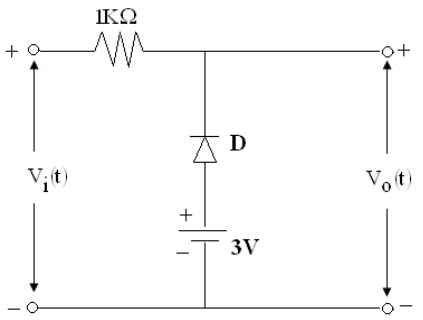
(iii) Output resistance (R_o)

(iv) Output voltage (V_{out}) **(8)**

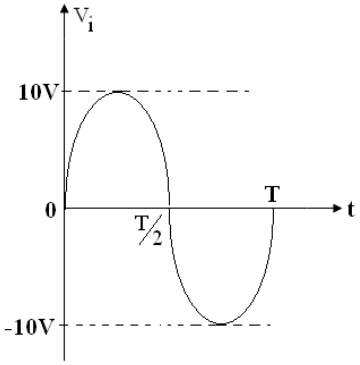
Q.8 a. Determine the output voltages for the following biased clipping circuits. Assume ideal diodes. **(6)**

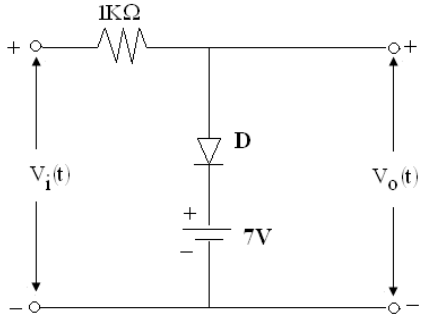
(i)





(ii)





b. Draw the circuit of monostable multivibrator using Bipolar Junction Transistors and explain its working. What are its applications? **(10)**

Q.9 a. What is Thermal Run-away in Transistors? How to avoid it? **(4)**

b. Why harmonic distortion is prominent in Power amplifiers? Support your answer with mathematical expressions. **(6)**

c. What is Input offset voltage and explain its significance in Op-Amp? **(6)**