MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : EC402 Analog Electronic Circuits

UPID : 004452

Time Allotted : 3 Hours *Full Marks :70*

The Figures in the margin indicate full marks.

Candidate are required to give their answers in their own words as far as practicable

Group-A (Very Short Answer Type Question)

1. Answer any ten of the following : [1 x 10 = 10]

(I) The CC configuration of BJT is mainly used for_____

(II) The maximum efficiency of a transformer coupled class A power amplifier is…….

(III) How many stable states are there in a Monostable multivibrator?

(IV) The value of the output impedance of an ideal op-amp is ----------

(V) The ac input to a half wave rectifier is 28.3Vpeak. Neglecting the drop across the diode, the dc across the load will be ----------.

(VI) The power amplifier that suffers mainly from the problem of crossover distortion is called ----------

(VII) State Barkhausen criteria for oscillation.

(VIII) In a logarithmic amplifier, the logarithmic effect of the input is obtained from ----------

(IX) Half wave rectifier is an example of a diode clamper circuit. State True/False

(X) If three cascaded stages of amplifiers have gains of 10,20,30, then what will be overall gain?

(XI) The voltage gain without negative feedback is 40dB. What is the new voltage gain if 3% negative feedback is introduced?

(XII) Astable multivibrator operating at 150 Hz has a discharge time of 2.5ms. Find the duty cycle of the circuit.

Group-B (Short Answer Type Question)

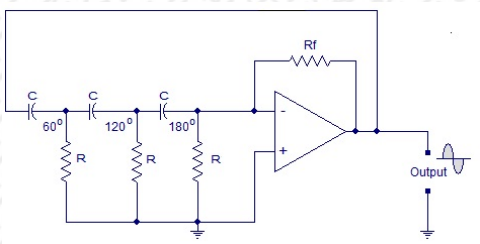
Answer any three of the following : [5 x 3 = 15]

2. What are the possible classifications of power amplifiers depending on the positions of their operating point? [5]

3. Derive the expression of Time period of an Astable multivibrator. [5]

4. What is cross-over distortion? How it can be eliminated? [5]

5. Find the oscillation frequency f of the phase shift oscillator when R = 10KΩ and C= 6.5nf [5]



6. a) Draw the circuit diagram of the Colpitt oscillator. [5]

b) In a Colpitt oscillator the values of the capacitors are C_1= 0.125μF, C_2= 0.02μF. Inductance coil L_1=0.5mH. Find i) the frequency of oscillation ii) if the frequency of oscillation is 20KHz find the value of inductance of coil iii) determine the voltage gain of the oscillator.

.

Group-C (Long Answer Type Question)

Answer any three of the following : [15 x 3 = 45]

7. (a) What is rectification? A CT full wave rectifier has turns ratio of 20:1, input supply voltage of 220V and load resistance of 500Ω. Determine i) the dc output voltage ii) the rms value of load current iii) efficiency of rectifier. [1+4]

(b) Design a clamper circuit to create a dc offset of -3V to a sine wave input of amplitude 5V also draw the output waveform. [5]

(c) Explain the operation of the LC filter. Determine the ripple factor of a LC-type filter comprising a 10H choke and 8F capacitor used with a full wave rectifier [3+2]

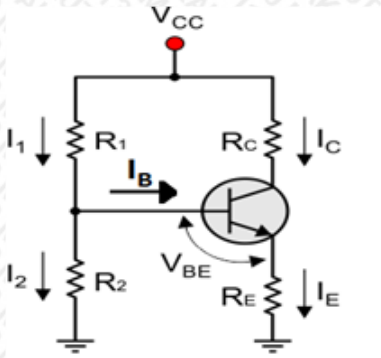
8. (a) Construct the circuit diagram and the frequency response characteristics of the 2-stage RC coupled CE transistor amplifier and derive its midfrequency voltage gain. [8]

(b) Explain the operation of a transformer-coupled Class A power amplifier. [7]

9. (a) Draw the circuit diagram of a voltage divider bias of a BJT and determine its operating point. [2+3]

(b) What is the stability factor? Find out the expression of current stability factor for voltage divider bias configuration. [2+3]

(c) If the various parameters of a CE amplifier in voltage divider bias method are V_{CC}=12V, R_1=10KΩ, R_2=5KΩ, R_C=1KΩ, R_E=2KΩ and β=100, find the operating point and stability factor assuming the transistor is made up of Si. [5]



10. (a) Define the conversion efficiency of a power amplifier. Prove that the maximum conversion efficiency of a direct coupled class A power amplifier is 25%. [4+5]

(b) Prove that the Class B push-pull power amplifier has higher efficiency than Class A amplifiers. [6]

11. (a) Explain the operation of an integrator circuit using an op-amp. [3]

(b) Explain how it operates as a low pass filter. [3]

(c) Write short notes on any three of the following [9]
(i) Integrator
(ii) Active filter
(iii) Voltage Comparator
(iv) Current Mirror

*** END OF PAPER ***