[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 1572 **F-3** **Your Roll No.....**

Unique Paper Code : 2511303

Name of the Course : **B.Tech Electronics**

Name of the Paper : Analog Electronics – I

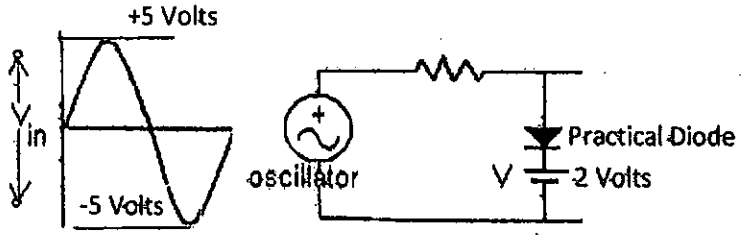
Semester : III

Duration : 3 Hours Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **FIVE** questions in all.
3. Question No. **1** is compulsory.
4. Use of Scientific Calculator is allowed.

1. (a) Sketch the output of the given circuit with suitable explanation if a practical silicon diode is used. (3)



(b) Explain the meaning of static and dynamic resistances of the diode. (3)

(c) Draw and explain the Output Characteristics of Common Emitter (CE) transistor (n-p-n type). (3)

P.T.O.

(d) A three section RC phase shift oscillator has R = 10KΩ and C = 0.001μf. What is the frequency of oscillation ? If the oscillator is to be made variable, using same value of R, what should be the tuning range of capacitor for frequency range of 1 to 100 kHz ? (3)

(e) Differentiate between voltage and power amplifier. (3)

2. (a) What are Clampers ? Give one application. Draw and explain the circuit of biased positive clamper. (6)

(b) Analyze Zener diode voltage regulator for

(i) V_i and R_L Fixed

(ii) Fixed V_i, Variable R_L

(iii) Fixed R_L, Variable V_i (6)

(c) What is the ripple factor of a Full Wave Rectifier (FWR) with capacitor filter if the value of R_L = 1KΩ and C = 10μF. (3)

3. (a) Derive the expressions for Current gain, Voltage gain, input resistance and output resistance of CE amplifier using H-parameters. (8)

(b) Find the operating point and draw the load line of a voltage divider self bias circuit using n-p-n transistor biased in active region. Given β = 100, V_{CC} = 12 V, R_1 = 60 KΩ, R_2 = 10 KΩ, R_C = 5 KΩ and R_E = 1 KΩ. (5)

(c) Explain the concept of thermal runaway. (2)

4. (a) Distinguish between positive and negative feedback. Give one application of each. (4)

(b) Derive the expression of Input Resistance, Current Gain, Voltage Gain and Output Resistance for Voltage Series Feedback circuit. (8)

(c) A voltage amplifier with a gain of 50dB employ's 1/50th of its output to negative feedback. Calculate gain with feedback. (3)

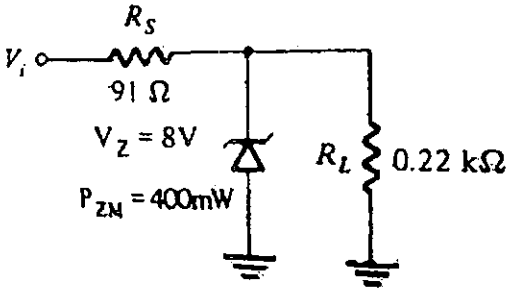
5. (a) Prove that efficiency of Class B power amplifier is 78%. (6)

(b) Calculate Power efficiency of Class A transformer coupled amplifier if $V_{CC} = 15$ V and $R_L = 15\Omega$. (3)

(c) Derive the expression of voltage gain for a common source JFET amplifier using small signal model. (6)

6. (a) Draw the circuits for Centre-tap Full Wave rectifier and Bridge rectifier and derive the expression for efficiency for the same.

(b) Determine the range of V_i that will maintain output voltage (V_L) at 8 V and not exceed the maximum power rating of the zener diode. (3)



(c) Assume that a n-p-n Si-transistor based Voltage divider circuit with $\beta = 50$, $V_{BE} = 0.6V$, $V_{CC} = 22.5V$ and $R_C = 5.6K\Omega$, it is desired to establish a Q-point at $V_{CE} = 12V$, $I_C = 1.5$ mA and a stability factor $S \leq 3$. Find R_1, R_2 and R_E. (6)

7. (a) Draw the circuit diagram of Colpitt Oscillator (transistor based) circuit and derive the expression of the frequency of oscillation for the same. (8)

(b) Explain how even harmonics are eliminated in push pull amplifier configuration. (3)

(c) For transformer coupled Class A amplifier, the transformer has a turn ratio of 10:1 and secondary load resistance is 10Ω. If the zero signal collector current is 100 mA, find the output power. (4)