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Code No.: **10046**

FACULTY OF ENGINEERING

B.E. II/IV Year (ECE) II Semester (Main) Examination, April 2006

ANALOG ELECTRONIC CIRCUITS

Time : 3 *Hours*] [*Max. Marks* : 75

Answer **all** *questions of* Part A.

Answer **five** *questions from* Part B.

Assume any data if missing.

Part A – (Marks : 25)

1. Sketch the frequency response of a transformer coupled amplifiers. Give the reasons for the fall in gain at low and high frequencies. 3

2. What is the range of frequency in terms of 'f_T' upto which the hybrid-π equivalent circuit of CE amplifier is valid? 2

3. What is harmonic distortion in power amplifiers and why does it occur? 2

4. Why class AB is preferred over class B in audio frequency power amplifiers. 2

5. An amplifier has an open loop voltage gain 1000 ± 100. If 10% negative feedback is introduced, what will be its closed loop voltage gain and its variation? 3

6. Comment why RC oscillators cannot be used at radio frequencies. 2

7. What factors decide the frequency stability of an oscillator? 3

8. Sketch the frequency response of a staggered tuned amplifier. State its advantages over cascaded single tuned amplifiers. 3

9. State the advantages of class C power amplifiers over class B tuned power amplifiers. 2

10. What are the limitations of zener voltage regulators and how do you over-come them? 3

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Part B – (Marks : 5 × 10 = 50)

1. (a) Explain the role of emitter by pass capacitance on the low frequency response of an RC coupled CE amplifier. 4

(b) A BJT is tuned to have f_T = 500 MHz, g_m = 100 mmhos, h_{fe} = 100 and Cb'c = 5pF. It is used as an CE amplifier with Rs = 1 KΩ and R_L = 2KΩ. Assume rbb' = 0. Determine for the amplifier (i) the mid-band voltage gain (v_o/v_s) and (ii) upper 3-dB cutoff frequency. 6

2. (a) What is cross over distortion in class B push pull amplifier and how do you eliminate it? Explain your answer with a neat circuit diagram and waveforms. 4

(b) A power transistor is used as a class A transformer coupled amplifier and is to deliver a maximum of 5 watts to a 4 ohm load. Operating point is adjusted for symmetrical clipping with collector supply voltage of 20V. Assume ideal characteristics with V_{min} = 0. Calculate for the amplifier (i) Transformer turns ratio (ii) peak collector current and (iii) collector circuit efficiency. 6

3. (a) Prove that negative feedback in amplifiers reduces the distortion. State the assumptions made in your derivation. 4

(b) Design a colpitts oscillator to oscillate at 1 MHz using a BJT having h_{ie} = 2 KΩ and h_{fe} = 100. Use capacitances of 1000 pF and 500 pF. Show the circuit diagram with all the component values along with biasing circuit. Derive the expressions used in your design. 6

4. (a) What is the possibility of oscillations in a tuned amplifier? How do you neutralize a BJT tuned amplifier against oscillations. Explain your answer with a neat circuit diagram and derive the expressions for the neutralizing components. 5

(b) Draw the circuit diagram of a double tuned transformer coupled voltage amplifier using a BJT. Derive the expressions for its voltage gain at the centre frequency and band-width for critical coupling. 5

5. (a) State the advantages of SMPS over conventional voltage regulator. Show the block schematic diagram of a SMPS and explain its operation. 5

(b) An unregulated D.C. source of (12 ± 2) V is available and is to be regulated using a zener diode to provide 6 V at 25 mA. A 6 V zener diode is available. Show the circuit diagram with the component values. What is its output impedance? 5

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6. (a) A BJT has h_{ie} = 2 KΩ, $h_{re} = 10^{-5}$, h_{fe} = 100 and h_{oe} = 25 μA/V. It is used as an emitter follower amplifier with R_s = 1KΩ and R_L = 5KΩ. Determine for the amplifier $A_{vs} = v_o/v_s$, R_i and R_o. 5

(b) For the two stage feedback amplifier shown in figure 1.0, determine the voltage gain $A_{vf} = v_o/v_s$, R_{if} and R_{of}. Assume that the transistors are identical and have h_{ie} = 2 KΩ, h_{fe} = 80 as parameters. 5

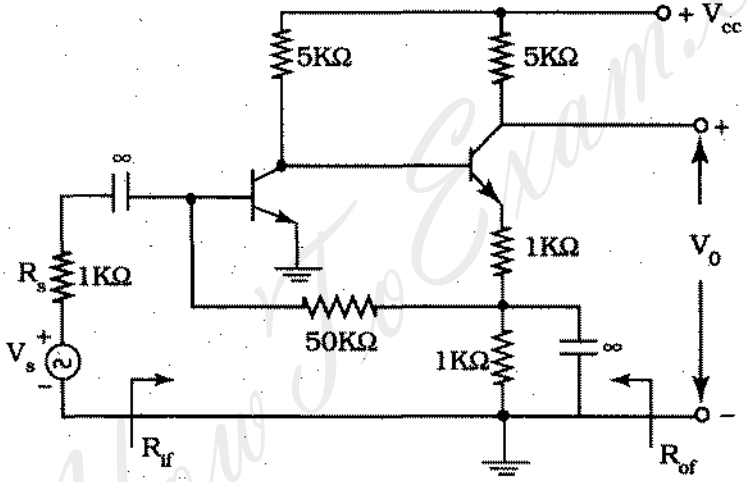

Figure 1.0

7. (a) What is a flyback converter? What are its advantages? Show the circuit diagram of a voltage regulator with fly back and explain its operation. 4

(b) Draw the circuit diagram of a tuned class C power amplifier and explain its operation with waveforms. Give the complete analysis of the amplifier and derive the expression for its output power and collector circuit efficiency. 6

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