7. (a) Design the Collpitt's oscillator and explain with help of circuit diagram. Derive the expressions for frequency of oscillation and condition for oscillation, respectively. 6

(b) Drive the formula $f_T = h_{fe} f_H f_\beta$, where f_T is gain-bandwidth product, h_{fe} is current gain, and f_β is bandwidth of amplifier in CE configuration respectively. 8

8. (a) Derive expression for current gain in case of amplifier in CE configuration and operated at high frequency (assume output is short circuited). 6

(b) Draw the circuit diagram of **class A** transformer coupled power amplifier and compute the conversion efficiency using mathematical analysis. 8

9. (a) Write down difference between tuned amplifier and amplifier having resistive load with help of circuit diagram and transfer functions. 6

(b) Derive expression for tilt/sag in the output of amplifier acting as high pass circuit (CR circuit) and operated at input step input voltage signal. 8

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Code : 041504

B.Tech 5th Semester Examination, 2016

Analog Electronics

Time : 3 hours *Full Marks : 70*

Instructions :

(i) There are Nine Questions in this paper.

(ii) Attempt Five questions in all.

(iii) Question No. 1 is compulsory.

(iv) The marks are indicated in the right-hand margin.

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1. Answer the following questions in brief preferably in one/two line (any seven): 2×7=14

(a) Write two applications of oscillators.

(b) Which configuration has highest output impedance in case of equivalent circuit of BJT at low frequency in CE, CB; and CC configuration?

(c) In CE amplifier operated at low frequency, what is the phase shift of output current to this input current?

(d) List two types of feedback used in the amplifier.

(e) What are the Barkhausan criteria for oscillation?

(f) Which harmonics are present in the output in case of Class B push-pull power amplifier?

(g) What is the advantage of CC-CE configuration?

(h) What is the advantage of CE-CB configuration?

(i) Write down the formula that relates rise time and high cut off frequency in case of amplifier behaving as low pass circuits at higher frequency.

(j) Write mathematical expression for harmonic distortion.

2. (a) Discuss about ideal voltage amplifiers and ideal current amplifier with diagram and transfer characteristics. 6

(b) Discuss about frequency and phase distortions, respectively with help of mathematical expressions. 8

3. (a) Write the effect of cascading the CE-CC two stages of amplifiers in term of input impedance, output impedance, current gain and voltage gain over individual stages. 6

(b) Derive the expression for voltage gain in case of CE amplifier with emitter resistance R_e operated at low frequency. 8

4. (a) Derive expression for upper cut off frequency in case of cascade amplifier, also computer the upper cut off frequency if individual stage upper cut off frequency is 4 MHz and number of cascaded stages are 10. 6

(b) Derive formula: $t_r = 0.35/f_H$, where t_r is rise time and f_H is high cut off frequency. Above formula needs to be derived for step input applied to the amplifier that is acting as low pass RC circuit at high frequency. 8

5. (a) Write down about any two of the following with help of mathematical expressions. 6

(i) Thermal noise

(ii) Shot Noise

(iii) Flicker noise

(b) Derive voltage gain for common source FET amplifier operated at low frequency. 8

6. (a) Draw circuit diagram of Wein bridge oscillator and derive the expression for its frequency of oscillation.

(b) Explain working of class AB power amplifier with help of circuit diagram and also draw its input-output characteristics curve. 8