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QUESTION BANK (DESCRIPTIVE)

Subject with Code : Linear IC Applicatons(16EC417) **Course & Branch**: B.Tech - ECE & EEE

Year &Sem: III-B.Tech& I-Sem **Regulation:** R16

UNIT –I

DIFFRENTIAL AMPLIFIER & OP AMP

1. a) Compare different configurations of differential amplifier? [L2][CO1][6M]
   b) Explain the dual input balanced output differential amplifier with a neat circuit diagram? [L2][CO1][6M]

2. a) Explain DC analysis of dual input balanced output differential amplifier? [L2][CO1][7M]
   b) Why is Re in an emitter coupled differential amplifier replaced by a constant current source with circuit Diagram? . [L1][CO1][5M]

3. Calculate the amplification factor for AC signal input in dual input balanced output differential amplifier? . [L1][CO1][12M]

4. Design the dual input balanced output differential amplifier to meet the following specifications and draw the circuit with designed values.
   R_c= 2.2KΩ, R_E = 4.7KΩ, R_{in1}= R_{in2}= 50Ω, +Vcc = +10V, -V_{EE}= -10V and the transistor is The CA 3086 with β_{dc}= β_{ac}= 100 and V_{BE}= 0.715 V typically.
   a). Determine the Icq and VCEq b). Determine Voltage gain
   c). Determine the input and output resistances? [L2][CO1][12M]

5.a). Explain how the constant current bias circuit is replaced by the current mirror circuit? [L2][CO1][5M]
   b) Explain and derive the current expression of current mirror circuit diagram? [L2][CO1][7M]

6. a) Draw the circuit of basic current mirror and explain its operation? [L2][CO1][7M]
   b) What is level translator? Explain the necessity of level translator stage in cascading differential amplifier?.[L1][CO1][5M]
7. a) Draw and explain the various functional blocks of an operational amplifier IC ? [L2][CO1][6M]
   b) Discuss the DC characteristics of an OP-AMP in detail? [L2][CO1][6M]

8. a) Draw the equivalent circuit diagram of Op amp and explain the voltage transfer curve? [L2][CO1][6M]
   b) Compare and contrast ideal and practical op-amp? [L2][CO1][6M]

9. a) Explain about open loop op-amp configurations [L2][CO1][4M]

b).Explain about the virtual ground concept. [L2][CO1][4M]
c). Draw the pin configuration of the IC 741 and explain each pin? [L2][CO1][4M]

10.a) Explain the importance of TL082 dual JFET input Op-Amp [L2][CO1][6M]
b) Draw the pin configuration of TL081 & TL082 Op-Amp. [L2][CO1][6M]

UNIT –II

FEEDBACK AMPLIFIERS & FREQUENCY RESPONSE

1. a)Derive the input resistance and output resistance for a voltage shunt feedback Amplifier. [L2][CO2][7M]
   b) In Non-inverting inverting feed back op-amp R1= 10KΩ, Rf= 100KΩ and Vin= 1V then the load of 25 KΩ is connected to the output terminal, calculate I_1, Vo, I_L and Io. [L2][CO2][5M]

2. a) Exlain about the op-amp non-inverting amplifier and derive the voltage gain? [L1][CO2][5M]
   b) Explain voltage series feed back amplifier with Voltage gain and input resistance? [L1][CO2][7M]

3. a) Explain voltage shuntfeed back amplifier with Voltage gain and input resistance? [L4][CO2][6M]
   b) Draw the circuit of differential amplifier with one Op-Amp and derive the expression voltage gain? [L1][CO3][6M]

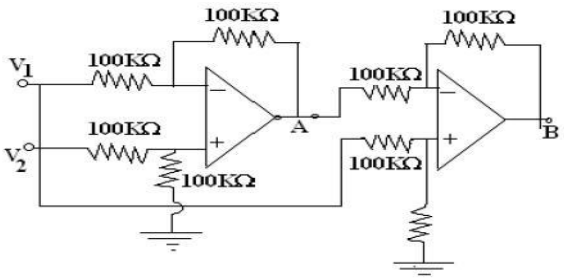
4. a) Define input bais current, input offset current and input offset voltage? [L2][CO2][6M]
   b) Explain about the pole zero frequency compensation network? [L2][CO2][6M]

5. a) Explain about the dominant pole frequency compensation network? [L2][CO2][6M]
   b) Write the difference between compensating and un compensating networks? [L2][CO2][6M]

6. Explain in detail about external frequency compensation techniques with neat sketches.? [L2][CO2][12M]

7.a) Draw and Explain the high frequency equivalent model of the op-amp? [L2][CO2][6M]
   b) Explain about the unity gain bandwidth product that how influences the frequency response? [L2][CO2][6M]

8.a) Derive the expression for closed-loop gain for practical inverting op amp? . [L2][CO2][6M]
   b) What is the voltage at point A and B for the circuit shown in figure below, if V_1 = 5 V and V_2 = 5.1 V? . [L2][CO2][6M]



9. a)Explain the importance of the stability criterion of the op-amp? [L2][CO2][6M]
   b) Define the total input offset voltage and thermal drift? [L2][CO2][6M]

10.a) Explain and derive slew rate and write the importance in op-amp circuits? [L2][CO2][8M]
   b) Compare the open loop and closed loop op-amp? [L2][CO2][4M]

UNIT –III

LINEAR APPLICATIONS AND ACTIVE FILTERS

1.a) Design and explain the operation of inverting summing amplifier? [L2][CO3][6M]
b)The op-amp non-inverting summing circuit has the following parameters V_{CC} = +15 V, V_{EE} = -15V, R = R_1= 1 kΩ, R_f = 2 kΩ, V_1 = +2 V, V_2 = -3 V, V_3 = +4 V. Determine the output voltage V_o.. [L2][CO3][6M]

2. Explain &Derive the expression for 3 input non-inverting summing amplifier with circuit diagram? [L2][CO3][12M]

3. a) What is voltage follower? What are its features and applications? [L1][CO3][5M]
b) Explain &Derive the expression for 2 input subtractor amplifier with circuit diagram? [L2][CO3][7M]

4. Draw the circuit diagram of the instrumentation amplifier and derive the gain? [L1][CO3][12M]

5. a) Write short notes on V-I and I-V converters using op-amps? [L1][CO3][6M]
b) Derive the expression of Current to Voltage Converter? [L1][CO3][6M]

6. a) Draw a neat circuit of an integrator circuit. Explain the functioning with the input-output Waveforms? [L2][CO3][6M]
b) Derive the output voltage $V_O$of practical integrator circuit? [L1][CO3][6M]

7. a) Derive the output voltage V_O of practical differentiator circuit? [L1][CO3][6M]
b) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 kHz? [L2][CO3][6M]

8. Draw the frequency resonsesof ideal&practical integrator and differentiator circuits? [L2][CO3][12M]

9. Explain the operation of first order low pass butter worth filter& derive the exression for filter gain & draw a neat sketch of frequency resonse? [L2][CO3][12M]

10.a) Write the design steps of the second order low pass filter and draw its circuit? [L1][CO3][6M]
b) Design a second order low pass filter for a cutoff frequency of 100 Hz and draw the circuit diagram? [L1][CO3][6M]

UNIT IV

NON LINEAR APPLICATIONS & SPECIALIZED APPLICATIONS

1.a)What are the conditions to be satisfied by a circuit to produce oscillations? [L1][CO4][5M]
b)Draw the block diagram of Oscillator and explain its operation? [L3][CO4][7M]

2. Draw the circuit diagram of RC phase shift oscillator and derive the expression for its frequency of oscillations? [L3][CO4][12M]

3. a) Draw and explain the operation of Wein bridge oscillator and derive its frequency expression? [L2][CO4][6M]
b) Generate a triangular wave from the square wave with a neat expressions? [L1][CO4][6M]

4.a) Explain the square wave generator with neat circuit diagram? [L2][CO4][6M]
b) Explain the saw tooth wave generator with neat circuit diagram? [L2][CO4][6M]

5.a) Explain the comparator and zero crossing detector? [L2][CO4][6M]
b) Explain the operation of Schmitt trigger.Discuss its characteristics and limitations? [L1][CO4][6M]

6. a) Explain in which the 555 timer can be used as monostablemultivibrator? [L1][CO4][6M]
b) Explain in which the 555 timer can be used as Astablemultivibrator? [L2][CO4][6M]

7.a) Discuss the applications of Astablemultivibrator? [L1][CO4][6M]
b) Draw the block diagram of PLL and explain its operation? [L1][CO4][6M]

8.a) Draw the circuit of PLL as frequency multiplier and explain its working? [L1][CO4][6M]
b) Explain frequency translation and FSK demodulation using 565PLL? [L2][CO4][6M]

9.a) What is the purpose of law pass filter in a phase Locked Loop? Describe different types of law pass filters used in a PLL? [L1][CO4][6M]
b) Explain the performance parameters of multiplier & its characteristics? [L2][CO4][6M]

10.Explain in detail about wide bandwidth Precision Multiplier and its Applications? [L2][CO4][12M]

UNIT- V
CONVERTERS

1.a) Draw and explain the weighted resistor DAC? [L1][CO5][6M]
b) Explain about ladder type DAC? [L1][CO5][6M]

2.a) Explain the operation of Weighted Resistor DAC with the help of circuit Diagram? [L2][CO5][7M]
b) The basic step of a 9 bit DAC is 10.3 mV. If "000000000" represents 0 V. What output is produced if the input is "101101111"? [L1][CO5][5M]

3.LSB of a 9 - bit DAC is represented by 19.6 mv. If an input of 9 zero bits is Represented by 0 volts.
i. Find the output of the DAC for an input 10110 1101 and 01101 1011?
ii. What is the full scale reading (FSR) of this DAC? [L1][CO5][12M]

4. Draw and explain in detail about R-2R DAC with an example? [L1][CO5][12M]
5.a) Calculate the no. of bits required to represent a full scale voltage of 10 V with a resolution of 5mV approximately? [L1][CO5][4M]
b) An 8-bit Analog to Digital converter has a supply voltage of +12 volts. Calculate:
(i) The voltage step size for LSB?
(ii) The value of analog input voltage for a digital output of 01001011 ? [L1][CO5][8M]

6.a) Explain about the sample and hold circuits? [L2][CO5][5M]
b) Explain about flash type ADC? [L2][CO5][7M]

7. Explain about counter type ADC with neat block diagram? [L2][CO5][12M]

8.Draw and explain successive approximation type ADC with an example? [L1][CO5][12M]

9.Draw the circuit diagram of single Slope ADC and exp lain its working with neat Sketches? [L2][CO5][12M]

10.Draw the circuit diagram of Dual Slope ADC and explain its working with neat Sketches? [L1][CO5][12M]

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