Course Code: 19EC0446 **R19**

SIDDHARTH GROUP OF INSTITUTIONS:: PUTTUR
(AUTONOMOUS)
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QUESTION BANK (DESCRIPTIVE)

Subject with Code: Analog electronics circuits(19EC0446)
Year & Sem: II-B.Tech& II-Sem

Course & Branch: B.Tech EEE
Regulation: R19

UNIT –I
FEEDBACK AMPLIFIERS

1	a) Illustrate the basic concept of Feedback amplifier with suitable block diagram b) List the characteristics of negative feedback amplifiers.	[L2][CO1] [L1][CO1]	**[6M]** **[6M]**
2	a) Explain in detail about basic Amplifiers used in Feedback amplifiers. b) Interpret Feedback amplifier topologies with necessary diagram.	[L2][CO2] [L2][CO2]	**[6M]** **[6M]**
3	a) Prove that bandwidth of an amplifier can be extended by using negative feedback amplifier? b) An amplifier has voltage gain with feedback of 100. If the gain without feedback changes by 20% and the gain with feedback should not vary more than 2%, determine the value of open-loop gain, A and feedback ratio, β.	[L5][CO3] [L4][CO3]	**[6M]** **[6M]**
4	Derive the expressions of Gain, input and output resistances for a VoltageShuntFBA.	[L2][CO3]	**[12M]**
5	Derive the expressions of Gain, input and output resistances for a VoltageSeries FBA.	[L2][CO3]	**[12M]**
6	a) Determine the input and output resistances of Current Shuntfeedbackamplifier. b) An amplifier has midband voltage gain of 1000 with f_L=50Hz ,f_h=50khz ,if 5% of feedback is applied then calculate f_L,f_h with feedback	[L2][CO1] [L4][CO3]	**[6M]** **[6M]**
7	Determine the voltage gain ,input and output impedance with feedback for voltage series having A=-100,R_i=10kohm,R_o=10kohm for feedback of i)β=-0.1 ii)β=-0.5	[L4][CO3]	**[12M]**
8	a) Compare and Contrast the various types of feedback amplifiers. b) an amplifier has open lop gain 1000 and feedback ration 0.04if the open lop gain changes by 10% due to temperature find the percentage change in gain of the amplifier feedback	[L2][CO1] [L4][CO3]	**[6M]** **[6M]**
9	a)compare positive feedback and negative feedback amplifiers b) Show that negative feedback reduces gain of an Amplifier.	[L1][CO1] [L1][CO1]	**[6M]** **[6M]**
10	Derive the expressions of Gain, input and output resistances for a current Series FBA.	[L2][CO3]	**[12M]** **]**

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UNIT –II
OSCILLATORS

1	a) Illustrate the condition for oscillation with suitable diagram. b) Interpret the various types of oscillators.	[L2][CO1] [L1][CO1]	**[6M]** **[6M]**
2	a Construct RC phase shift oscillator using BJT with necessary diagram and derive its expression for frequency of oscillations. b Determine the frequency of oscillations when a RC phase shift oscillator has R=100 kΩ, C=0.01μF and R_C = 2.2 KΩ.	[L2][CO2] [L5][CO2]	**[6M]** **[6M]**
3	a) Determine the condition for sustained oscillations for an RC phase shift Oscillator with necessary circuit diagrams. b) Design a RC phase shift oscillator to generate 5 KHz sine wave with 20 V peak to peak amplitude. Draw the designed circuit. Assume h_{fe} = 150.	[L5][CO3] [L3][C04]	**[6M]** **[6M]**
4	a) Explain the working principle of Wein-bridge oscillator using BJT and derive the expression for frequency of oscillations. b) In a Wein-bridge oscillator, if the value of R is 100 KΩ, and frequency of oscillation is 10 KHz, Examine the value of capacitor C.	[L2][CO5] [L2][CO4]	**[6M]** **[6M]**
5	Analyze an LC Oscillator with necessary equation	[L4][CO6]	**[12M]**
6	Explain Hartley oscillator using BJT and derivethe expression for its frequency of oscillations and condition for sustained oscillations..	[L2][CO3]	**[12M]**
7	a) Explain in detail aboutCrystal oscillator and give the expression for its frequency of oscillations. b) In a transistorized Hartley oscillator,the two inductances are 2 mH and 20 μH while the frequency is to be changed from 950 KHz to 2050 KHz. Calculate the range over which the capacitor is to be varied.	[L2][CO3] [L1][CO4]	**[6M]** **[6M]**
8	a) Draw the circuit diagram ofColpitts oscillator using BJT and derive the expression for frequency of oscillations. b) Colpitts oscillator is designed with C_1 = 100 pF and C_2 = 7500 pF.The inductance is variable. Determine the range of inductance values, if the frequency of oscillation is to vary between 950 KHz to 2050 KHz.	[L2][CO2] [L3][CO4]	**[6M]** **[6M]**
9	Analyze the condition for sustained oscillations for Hartley and Colpitts oscillator with suitable equation.	[L1][CO6]	**[12M]**
10	a) Explain the concept of stability in Oscillators in detail. b) In the Colpitts oscillator, C_1 = 0.2μF and C_2 = 0.02 μF. If the frequency of oscillationis 10kHz, Examine the value of inductor.	[L2][CO2] [L3][CO4]	**[6M]** **[6M]**

UNIT –III
OPERATIONAL AMPLIFIER

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1	a) Draw the various functional blocks of an operational amplifier IC. Explain each block. b). Draw the equivalent circuit diagram of Op amp and derive the expression for gain of inverting amplifier.	[L2][CO2] [L2][CO2]	**[6M]** **[6M]**
2	a). What is level translator? Explain the necessity of level translator stage in cascading differential amplifiers. b). Compare different configurations of differential amplifier.	[L1][CO1] [L2][CO1]	**[6M]** **[6M]**
3	a) Discuss the electrical characteristics of an OP-AMP in detail. b). Explain the term slew rate and write the importance in op-amp circuits?	[L1][CO1] [L2][CO3]	**[6M]** **[6M]**
4	a)What are the four different configuration of differential amplifier? b). Compare and contrast ideal and practical op-amp?	[L1][CO1] [L2][CO3]	**[6M]** **[6M]**
5	a)The op-amp non-inverting amplifier and derive the voltage gain? b).Explain ac characteristics of op-amp ?	[L2][CO3] [L2][CO3]	**[6M]** **[6M]**
6	a)Explain dc characteristics of op-amp ? b)define the terms cmrr, common mode gain, differential mode gain, slew rate	[L2][CO3] [L1][CO2]	**[6M]** **[6M]]**
7	a) List out the ideal characteristics of an operational amplifier. b) An op-amp has a slew rate of 2V/μs. What is the maximum frequency of an output sinusoid of peak value 5V at which the distortion sets in due to the slew rate limitation	[L4][CO3] [L4][CO4]	**[6M]** **[6M]**
8	a) What is voltage follower? What are its features and applications? b)Explain briefly i)virtual ground concept b)current mirror circuit	[L2][CO1] [L2][CO3]	**[6M]** **[6M]]**
9	a)Draw and explain frequency response of practical op-amp b)Define the terms drift,offsetvoltage,psrr,offset current	[L2][CO3] [L1][CO2]	**[6M]** **[6M]**
10	a)what is frequency compensation and explain how the frequency response is varied with respect to Compensation network b)Design an inverting amplifier with gain A= 10	[L2][CO3] [L3][CO4]	**[6M]** **[6M]**

UNIT –IV
APPLICATIONS OF THE OP-AMP

1	a**)** Design and explain the operation of inverting summing amplifier. 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 $V_{o.?}$	[L3][CO3] [L5][CO4]	**[6M]** **[6M]**
2	a)Draw the circuit of a difference amplifier with one op-amp and derive the expression for voltage gain b) An inverting amplifier with gain 1 have different input voltage: 1.2v,3.2v and 4.2v. Find the output voltage?	[L2][CO2] [L5][CO4]	**[6M]** **[6M]**
3	Draw a neat circuit of an integrator circuit. Explain the functioning with the input-output waveforms and derive the output equation	[L2][CO2]	**[12M]**
4	Draw a neat circuit of an integrator circuit. Explain the functioning with the input-output waveforms and derive the output equation	[L2][CO2]	**[12M]**
5	a) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 kHz. b)Explain sample and hold circuit using op-amp	[L3][CO3] [L2][CO1]	**[6M]** **[6M]**
6	a)Drawa neat circuit of astablemultivibrator using op-amp and explain	[L2][CO3]	**[6M]**

	operation with waveforms b)Define duty cycle ,if T_{on}=0.6 msec ,T_{off}=0.4 msec calculate percentage of duty cycle	[L5][CO4]	**[6M]**
7	a)Drawa neat circuit of monbostablemultivibrator using op-amp and explain operation with waveforms b)Derive the equation for pulse width of the monostable multivibrator using op-amp	[L2][CO2] [L3][CO3]	**[6M]** **[6M]**
8	a)Derive the equation for frequency of oscillation of astablemultivibrator using op-amp b)ForastablemultivibratorR$_2$=10 kohm,R$_1$=8.6 kohm,R$_f$=100 kohm and C=0.01 µF calculate frequency of oscilation	[L3][CO3] [L5][CO4]	**[6M]** **[6M]**
9	a)Drawcircuit diagram of triangular wave generator using op-amp and explain operation with waveforms b)Discuss the applications of Astablemultivibrator?	[L2][CO2] [L2][CO1]	**[6M]** **[6M]**
10	Explain the operation of triangular wave generator with neat circuit diagram and derive the equation for output frequency	[L3][CO2]	**[12M]**

UNIT –V
ACTIVE FILTERS AND CONVERTERS USING OP-AMP

1	a)Define a filter. how filters are classified b)Draw the circuit diagram and explain first order low pass butter worth filter	[L5][CO2] [L2][CO2]	**[5M]** **[7M]**
2	a)Explain various types of filters along with their frequency response b)Draw the circuit diagram and explain first order high pass butter worth filter	[L3][CO3] [L2][CO2]	**[6M]** **[6M]**
3	Design a lowpass filter at a cut-of frequency of 15.9kHz with passband gain 1.5 and plot frequency response of this circuit	[L3][CO3]	**[12M]**
4	Design a highpass filter at a cut-of frequency of 10kHz with passband gain 1.5 and plot frequency response of this circuit	[L3][CO3]	**[12M]**
5	a). Draw and explain the weighted resistor DAC 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.	[L2][CO3] [L5][CO4]	**[6M]** **[6M]**
6	a) Draw and explain in detail about R-2R DAC b).The basic step of a 9 bit DAC is 10.3 mV. If "000000000" represents 0 V. What output isproduced if the input is "101101111"?	[L2][CO3] [L5][CO4]	**[6M]** **[6M]**
7	a) Explain about flash type ADC? b) Discuss the parameters specifications of ADC?	[L3][CO1] [L2][CO1]	**[6M]** **[6M]**
8	Draw the circuit diagram of Dual Slope ADC and explain its working with neatsketches	[L3][CO2]	**[12M]**
9	a)Draw the circuit diagram of inverted R-2R DAC and explain its operation b) Discuss the parameters specifications of DAC?	[L2][CO2] [L2][CO1]	**[6M]** **[6M]**
10	Explain different types of ADC and DAC	[L3][CO1]	**[12M]**

Prepared by:

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