Course Code: 20EC0446

R20

SIDDHARTH GROUP OF INSTITUTIONS:: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code: 20EC0446-Analog Electronic circuits
Course & Branch: B.Tech EEE
Year & Sem: II-B.Tech & I-Sem
Regulation: R20

UNIT –I
FEEDBACK AMPLIFIERS

1	a)	What is feedback Amplifier?.Illustrate the basic concept of Feedback amplifier with suitable block diagram	[L3][CO1]	**[6M]**
	b)	Explain in detail about basic Amplifiers used in Feedback amplifiers.	[L2][CO1]	**[6M]**
2	a)	Interpret Feedback amplifier topologies with necessary diagram.	[L3][CO1]	**[6M]**
	b)	List the characteristics of negative feedback amplifiers.	[L1][CO1	**[6M]**
3	a)	Prove that bandwidth of an amplifier can be extended by using negative feedback amplifier.	[L5][CO1]	**[6M]**
	b)	An amplifier has voltage gain with feedback of 100. If the gai without feedback changes by 20% and the gain with feedback shoul not vary more than 2%, solve the value of open-loop gain, A an feedback ratio, β.	[L3][CO4]	**[6M]**
4		Summarize the expressions of Gain, input and output resistances for a Voltage Shunt FBA with necessary derivations.	[L2][CO4]	**[12M]**
5		Summarize the expressions of Gain, input and output resistances for a Voltage Series FBA with necessary derivations..	[L2][CO4]	**[12M]**
6	a)	Determine the input and output resistances of Current Shunt feedback amplifier.	[L3][CO1]	**[6M]**
	b)	An amplifier has midband voltage gain of 1000 with F_L = 50Hz , F_H =50KHz ,if 5% of feedback is applied then determine F_L , F_H .	[L3][CO3]	**[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	[L3][CO3]	**[12M]**
8		Summarize the expressions of Gain, input and output resistances for a Current Series FBA with necessary derivations.	[L2][CO4]	**[12M]**
9	a)	Compare positive feedback and negative feedback amplifiers	[L2][CO2]	**[6M]**
	b)	Show that negative feedback reduces gain of an Amplifier.	[L1][CO1]	**[6M]**
10	a)	Compare and Contrast the various types of feedback amplifiers.	[L2][CO1]	**[6M]**
	b)	An amplifier has open loop gain 1000 and feedback ratio of 0.04,if the open lop gain changes by 10% due to temperature, find the percentage change in the gain of the amplifier feedback.	[L3][CO3]	**[6M]**

Prepared by Dr R Gomalavalli,
professor, ECE,SIETK

Course Code: 20EC0446

R20

UNIT –II
OSCILLATORS

1	a)	What is anOscillator?Explain the principle of operation of an oscillator.	[L2][CO1]	**[6M]**
	b)	Illustrate the Barkhausen criterion condition for oscillation with suitable diagram.	[L2][CO1]	**[6M]**
2	a)	Interpret the various types of oscillators.	[L3][CO1]	**[6M]**
	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.	[L3][CO4]	**[6M]**
3	a)	Determine the condition for sustained oscillations for an RC phase shift Oscillator with necessary circuit diagrams.	[L3][CO2]	**[6M]**
	b)	Design a RC phase shift oscillator to generate 5 KHz sine wave with 20V peak to peak amplitude. Draw the designed circuit. Assume h_{fe} = 150.	[L3][C03]	**[6M]**
4	a)	Explain the working principle of Wein-bridge oscillator using BJT and derive its frequency expression for sustained oscillations.	[L2][CO5]	**[6M]**
	b)	In a Wein-bridge oscillator, if the value of R is 100 KΩ, and frequency of oscillation is 10 KHz, estimate the value of capacitor C.	[L2][CO4]	**[6M]**
5	a)	Compare RC phase shift oscillator and Wein-bridge oscillator.	[L2][CO2]	**[6M]**
	b)	Derive the generalized equation of a LC Oscillator with its circuit.	[L3][CO6]	**[6M]**
6	a)	Draw the circuit diagram of Hartley oscillator using BJT and derive the expression for frequency of oscillations.	[L3] [CO1]	**[6M]**
	b)	A 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. Find the range over which the capacitor is to be varied.	[L3][CO4]	**[6M]**
7	a)	Draw the circuit diagram of Colpitts oscillator using BJT and derive the expression for frequency of oscillations.	[L3][CO1]	**[6M]**
	b)	Colpitts oscillator is designed with C_1 = 100 pF and C_2 = 7500 pF.The inductance is variable. Identify the range of inductance values, if the frequency of oscillation is to vary between 950 KHz to 2050 KHz.	[L2][CO4]	**[6M]**
8	a)	Compare piezoelectric effect and inverse piezoelectric effect with a neat diagram	[L2] [C06]	**[4M]**
	b)	Explain in detail about the crystal oscillator and derive the expression for its frequency of oscillation.	[L2][CO1]	**[8M]**
9	a)	Summarize the difference between Hartley and Colpitts oscillators.	[L2][CO4]	**[6M]**
	b)	In the Colpitts oscillator, C1 = 0.2μF and C2 = 0.02 μF. If the frequency of oscillationis 10kHz, Examine the value of inductor	[L3][CO4]	**[6M]**
10	a)	Summarize the difference between Colpitts and Crystal oscillators.	[L2][CO4]	**[6M]**
	b)	Explain the concept of stability in Oscillators in detail.	[L2][CO6]	**[6M]**

Prepared by Dr R Gomalavalli,
professor, ECE,SIETK

Course Code: 20EC0446

R20

UNIT –III
OPERATIONAL AMPLIFIER

1	a) Explain the basic information and pin configuration of an op-amp	[L2] [CO1]	**[6M]**
	b) List out the ideal characteristics of an operational amplifier.	[L1][C03]	**[6M]**
2	a) Discuss the electrical characteristics of an op-amp in detail.	[L2][CO1]	**[6M]**
	b)What is level translator? Explain the necessity of level translator stage in cascading differential amplifiers.	[L2][CO2]	**[6M]**
3	a) Draw the equivalent circuit diagram of op-amp and derive the expression for gain of inverting amplifier.	[L3][CO5]	**[6M]**
	b)Design an inverting amplifier with gain A= 10	[L3][CO5]	**[6M]**
4	a)) Derive the voltage gain of non-inverting op-amp.	[L3][CO5]	**[6M]**
	b) What is voltage follower? What are its features and applications?	[L1][CO1]	**[6M]**
5	a) Differentiate inverting and noninverting op-amp.	[L2][CO1]	**[6M]**
	b) Design a noninverting amplifier with gain A=21.	[L3][CO5]	**[6M]**
6	a) Estimate the gain of a Differential amplifier	[L4][CO2]	**[6M]**
	b) Define the terms CMRR, common mode gain, differential mode gain.	[L1][CO2]	**[6M]]**
7	a) Explain DC characteristics of op-amp	[L2][CO3]	**[6M]**
	b) What is frequency compensation and explain how the frequency response is varied with respect to Compensation network?	[L2][CO6]	**[6M]**
8	a) Illustrate the following terms with neat diagram i)Input bias current ii)Input offset current	[L3][CO1]	**[6M]**
	b)Explain briefly i)virtual ground concept b)Thermal Drift	[L2][CO1]	**[6M]]**
9	a)Draw and explain frequency response of practical op-amp	[L2][CO1]	**[6M]**
	b)Define the terms drift,offset voltage,PSRR,offset current	[L1][CO2]	**[6M]**
10	c) a)Explain the term slew rate and illustrate the importance in op-amp circuits?	[L2][CO3]	**[6M]**
	d) b)An op-amp has a slew rate of 2V/µs. What is the maximum frequency of an output sinusoidal its peak value of 5V at which the distortion sets in due to the slew rate limitation	[L1][CO4]	**[6M]**

Prepared by Dr R Gomalavalli,
professor, ECE,SIETK

Course Code: 20EC0446

R20

UNIT –IV
APPLICATIONS OF THE OP-AMP

1	a) Design and explain the operation of inverting summing amplifier.	[L3][CO3]	**[6M]**
	b) Design an inverting adder circuit using an op-amp to get the output expression as $V_o=-(0.1V_1+V_2+10V_3)$,Where V_1,V_2 and V_3 are the inputs.	[L3][CO3]	**[6M]**
2	a) Design and explain the operation of non-inverting summing amplifier.	[L3][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..	[L3][CO3]	**[6M]**
3	a)Draw the circuit of a subtractor using op-amp and derive the expression for voltage gain.	[L3][CO1]	**[6M]**
	b) Draw an op-amp circuit whose output is $V_o=(V_3+V_4)-(V_1+V_2)$.	[L3][CO1]	**[6M]**
4	a)Explain the operation of differentiator using op-amp with a neat circuit diagram.	[L3][CO5]	**[6M]**
	b)Draw the input-output waveforms and frequency response of differentiator.	[L3][CO1]	**[6M]**
5	a)Explain the operation of integrator using op-amp with a neat circuit diagram.	[L3][CO5]	**[6M]**
	b)Draw the input-output waveforms and frequency response of integrator.	[L3][CO1]	**[6M]**
6	a) Explain sample and hold circuit using op-amp.	[L2][CO1]	**[6M]**
	b) Design a differentiator to differentiate an input signal that has $f_{max=}$100Hz .	[L3][CO5]	**[6M]**
7	a)Draw a neat circuit of astable multivibrator using op-amp and explain operation with waveforms.	[L2][CO2]	**[6M]**
	b)Define the duty cycle .Identify the percentage of duty cycle if T_{on}=0.6 msec ,T_{off}=0.4 msec	[L3][CO4]	**[6M]**
8	a)Derive the equation for frequency of oscillation of astable multivibrator using op-amp.	[L3][CO4]	**[6M]**
	b)Calculate the frequency of oscillation for an astable multivibrator having R_2=10 kohm,R_1=8.6 kohm,R_f=100 kohm and C=0.01 µF .	[L4][CO4]	**[6M]**
9	a)Explain the operation of monostable multivibrator using op-amp ,with a neat circuit and its waveforms	[L2][CO2]	**[6M]**
	b)Derive the equation for pulse width of the monostable multivibrator using op-amp.	[L3][CO4]	**[6M]**
10	Explain the operation of triangular wave generator using op-amp ,with a neat circuit diagram and its waveforms .	[L2][CO3]	**[12M]**

Prepared by Dr R Gomalavalli,
professor, ECE,SIETK

Course Code: 20EC0446

R20

UNIT –V
ACTIVE FILTERS AND CONVERTERS USING OP-AMP

1	a)Define active filter and give its characteristics.	[L4][CO2]	**[6M]**
	b)Explain the first order low pass butter worth filter with a neat circuit diagram.	[L2][CO2]	**[6M]**
2	a)Draw the frequency response of filters .	[L3][CO1]	**[6M]**
	b)Explain the first order high pass butter worth filter with a neat circuit diagram.	[L2][CO2]	**[6M]**
3	Design a lowpass filter at a cut-of frequency of 15.9kHz with passband gain of 1.5 and draw the frequency response .	[L3][CO3]	**[12M]**
4	Design a highpass filter at a cut-of frequency of 10kHz with passband gain 1.5 and draw the frequency response .	[L3][CO3]	**[12M]**
5	a) Explain the weighted resistor DAC with a neat diagram.	[L2][CO2]	**[6M]**
	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.	[L4][CO4]	**[6M]**
6	a) Explain in detail about R-2R DAC with a neat diagram.	[L2][CO3]	**[6M]**
	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][CO4]	**[6M]**
7	a) Draw the circuit diagram of inverted R-2R DAC and explain its operation.	[L2][CO2]	**[6M]**
	b) Design an inverted R-2R ladder DAC for digital input word 001.	[l3][C04]	**[6M]**
8	a) Explain about the flash type ADC using op-amp.	[L2][CO1]	**[6M]**
	b) Summarize the truth table for a flash type opamp ADC using 8 by 3 priority encoder.	[L2][CO4]	**[6M]**
9	Draw the circuit diagram of Dual Slope ADC and explain its working with neat sketches	[L2][CO2]	**[12M]**
10	Discuss the parameters specifications of DAC/ADC .	[L2]][CO1]	**[12M]**

Prepared by Dr R Gomalavalli,
professor, ECE,SIETK