

KADI SARVA VISHWAVIDYALAYA
B.E.SEMESTER 5th EXAMINATION NOVEMBER-2016

SUBJECT CODE: EC-505

SUBJECT NAME : Integrated Circuits and Applications

DATE: 19/11/16 TIME: 10:30 to 1:30 TOTAL MARKS: 70

Instructions:

1. Answer Each Section in Separate Answer sheet.
2. Use of Scientific Calculator is permitted.
3. All questions are compulsory.
4. Indicate **clearly**, the options you attempted along with its respective question number.
5. Use the last page of supplementary for rough work.

Section -1

- | | | |
|--------|---|---|
| Q-1 A. | Draw an explain the block diagram of Op-Amp | 5 |
| B. | Explain differential amplifier using op-amp. | 5 |
| C. | Draw the circuit of a summing operation amplifier and write an equation for output voltage of this circuit. | 5 |
- OR
- | | | |
|----|--|---|
| C. | Explain instrumentation amplifier using transducer bridge. | 5 |
|----|--|---|
- | | | |
|--------|---|---|
| Q-2 A. | Draw the circuit of an op-amp integrator and differential and derive the output expression. | 5 |
|--------|---|---|
- OR
- | | | |
|----|--|---|
| A | Explain op-amp as square wave generator or astable multivibrator with expression | 5 |
| B. | Explain op-amp as pulse generator or monostable multivibrator. | 5 |
- OR
- | | | |
|----|---|---|
| B. | Explain operation of Schmitt trigger using operation amplifier. | 5 |
|----|---|---|
- | | | |
|--------|---|---|
| Q-3 A. | What is comparator ?Explain working of op-amp as comparator with circuit diagram and input and output waveform. | 5 |
|--------|---|---|
- OR
- | | | |
|----|--|---|
| A | Draw and explain triangular and sawtooth wave form generator circuit using op-amp. | 5 |
| B. | What is limitation of basic log amplifier? Explain the remedy for the same and prove it. | 5 |
- OR
- | | | |
|----|---|---|
| B. | Explain with necessary diagram the working of AC amplifiers with single supply voltage. | 5 |
|----|---|---|

Section -2

- Q-4 A. Write short note on salien key circuit 5
B. Discuss the attenuation characteristics of ideal and practical low pass and bandpass filters 5
C. Design a biquad bandpass filter with a center frequency of $\omega_0 = 1000$ rad/s and bandwidth of 200rad/s. The midband gain H=1.
OR
C. For the following set of Butterworth LPF specifications: 5
 $\alpha_{max} = 0.5$ dB, $\alpha_{min} = 20$ dB, $\omega_p = 1000$ rad/sec, $\omega_s = 2000$ rad/sec
Determine:
1. Order of Butterworth LPF.
2. Pole location and corresponding Q_s .
3. Half power frequency.
- Q-5 A. Design an astable multivibrator for an output frequency of 5 khz and duty cycle 40% 5
OR
A. Draw and explain block diagram of 555 timer 5
B. Design free running ramp generator using IC 555 for $V_{cc} = 10V$ and period $T = 2ms$. Explain its working. 5
OR
B. Write a short note on pulse width modulator using 555 5
- Q-6 A. Describe working principle of PLL with diagram 5
OR
A. Explain frequency shift keying demodulator using PLL. 5
B. Explain Voltage Controlled Oscillator(VCO) using IC 566 5
OR
B. Draw block diagram of a regulated dc power supply and explain the function of each block. 5

KADI SARVA VISHWAVIDYALAYA

B.E SEMESTER 5TH EXAMINATION (November/2014)

SUBJECT CODE: EC-505

SUBJECT NAME: Integrated Circuits and Applications

DATE: 22/11/2014

TIME: 10:30 TO 1:30

TOTAL MARKS: 70

Instructions:

1. Answer each section in separate Answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are compulsory.
4. Indicate clearly, the options you attempted along with its respective question number.
5. Use the last page of main supplementary for rough work.

Section – 1

Q.1. Answer the following.

- (a) What is Operational Amplifier? Draw and explain the block diagram of a typical Op-Amp. 5
(b) List out three open loop op-amp configuration and explain any one in detail. 5
(c) Explain briefly the electrical characteristic of ideal Op-Amp. 5

OR

- (c) Define the following electrical parameters: (i) Input offset voltage (ii) Differential Input Resistance (iii) Slew Rate (iv) CMRR (V) PSRR. 5

Q.2. Answer the following Questions.

- (a) Write short note on Voltage Follower. 5
(b) For Voltage Shunt Feedback Amplifier, Find A_f , R_{if} and R_{of} . 5

$R_f = 4.7k\Omega$, $R_1 = 470 \Omega$, $A = 200000$, $R_i = 20 k\Omega$, $R_o = 450\Omega$, $UGB = 1kHz$, $\pm V_{sat} = 15V$.

Maximum o/p voltage swing = $\pm 13 V$.

OR

- (a) Write short note on Differential amplifier using single Op-Amp. 5
(b) Derive the expression for voltage gain and input resistance of an inverting amplifier using op-amp with negative voltage shunt feedback. 5

Q.3. Answer the following Questions.

- (a) Explain application of op-amp (Inverting configuration) as summing, scaling and averaging circuit. 5
(b) Briefly explain AC Amplifier with a single supply. 5

OR

- (a) Draw the basic circuit of Integrator using op-amp. What are the problems associated with this configuration? 5
(b) What is thermal drift? How does it affect the performance of an op-amp circuit? 5

Section – 2

Q.4. Answer the following.

- (a) Explain basic comparator using Op-Amp with input and output waveform. 5
(b) In the Schmitt Trigger circuit $R_1 = 150\Omega$, $R_2 = 68k\Omega$, $R_L = 10k\Omega$, $V_{in} = 500 \text{ mV}_{pp}$ sine wave & saturation voltage $= \pm 14 \text{ V}$. Calculate (i) V_{ut} (ii) V_{lt} (iii) Hysteresis Voltage V_{hy} . 5
(c) Explain Op-Amp based positive clipper circuit with positive reference voltage. Show necessary waveforms. 5

OR

- (c) Explain Square wave generator. 5

Q.5. Answer the following Questions.

- (a) Explain Sample and Hold circuit with input and output waveforms. 5
(b) Analyse second order Butterworth High Pass filter and draw its frequency response. 5

OR

- (a) Derive the expression for filter transfer function of first order low pass filter and also draw its frequency response. 5
(b) Design a wide band – pass filter with $f_L = 200 \text{ Hz}$, $f_H = 1 \text{ KHz}$, and pass band gain of 4. 5
Also calculate the value of quality factor Q.

Q.6. Answer the following Questions.

- (a) Draw and explain Monostable multivibrator using 555 timer IC. 5
(b) List out types of voltage regulator and also explain adjustable voltage regulators. 5

OR

- (a) What is PLL? Explain operation of PLL with basic block and also mention application of PLL. 5
(b) What is power booster? List the differences between the monolithic power amplifiers and the power amplifiers using power booster. 5

----- All the Best -----

KADI SARVA VISHWAVIDYALAYA
B.E. SEMESTER 5th (ATKT) EXAMINATION (APRIL/2015)

SUBJECT CODE : EC-505
DATE : 24/04/2015

SUBJECT NAME : INTEGRATED CIRCUITS AND APPLICATIONS
TIME : 10.30 am to 1.30 pm
TOTAL MARKS : 70

Instructions :

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are compulsory.
4. Indicate **clearly**, the options you attempted along with its respective question number.
5. Use the last page of the main supplementary for rough work.

Section – 1

- Q : 1 (A) **Define :** 05
1. Output offset voltage
 2. CMRR
 3. Slew rate
 4. Large signal voltage gain
 5. Output voltage swing
- (B) Draw and explain block Diagram of Typical OP-AMP. 05
- (C) A 741 op-amp as inverting amplifier is driven by peak to peak 10 volt sine wave. The closed loop gain is 4. Supply voltage of op-amp is +/-15V. Draw input and out waveforms. Show values of output peak voltage also. 05

OR

- (C) What is the difference between active and passive filters? Classify filters based on roll off factors, operating range and frequency response. 05

Q : 2 Answer the following questions.

- (A) Derive expressions for voltage gain, input resistance and bandwidth for Voltage-Series feedback amplifier. 05
- (B) Design second order Butterworth low pass filter with -3dB frequency of 10 KHz. Choose C = 1 nF. 05

OR

- (A) Explain voltage to current converter with floating load. Based on that show low voltage dc voltmeter circuit and discuss it. 05
- (B) Explain the operating principle of Phase Locked Loop. 05

Q : 3 Answer the following questions.

- (A) Draw circuit diagram of differential amplifier with one op-amp and derive expression for its output signal as a function of input signals. Also derive expression of input resistance faced by each input signal. 05
- (B) Design wideband band pass filter using a single op-amp for $f_L = 100$ Hz, $f_H = 1$ KHz and pass band gain of 4. Also calculate the value of quality factor Q. 05

OR

- (A) Derive the expression for filter transfer function of a first order low pass filter and draw its frequency response characteristics. 05
- (B) Derive the equation for voltage gain of first order low pass Butterworth filter. 05

Section – 2

- Q : 4 (A) Explain the operation of 555 IC based astable multivibrator with necessary circuit diagram and waveforms. 05
(B) Explain op-amp based positive clipper circuit with necessary waveforms. Draw output waveforms for (i) Positive reference voltage (ii) Negative reference voltage. Assume input signal is sine wave. 05
(C) Explain op-amp based inverting comparator circuits with (i) positive reference voltage (ii) negative reference voltage. Show necessary waveforms. 05

OR

- (C) List the different types of voltage regulators. Describe the operation of basic switching regulator. 05

Q : 5 Answer the following questions.

- (A) Draw and explain summing amplifier circuit using op-amp in inverting configuration based on that design a circuit such that $V_o = -2(3V_1 + 4V_2 + 2V_3)$. 05
(B) What are the characteristics of an ideal op-amp? Draw equivalent circuit of op-amp and ideal voltage transfer curve. 05

OR

- (A) What do you understand by precision rectifier ? Draw half wave precision rectifier circuit and explain with necessary waveforms. 05
(B) Draw and explain Monostable multivibrator using 555 timer IC. 05

Q : 6 Answer the following questions.

- (A) Design an astable multivibrator for an output frequency of 5 KHz and duty cycle 40%. Consider $C=0.047 \mu F$ 05
(B) Discuss magnitude and frequency scaling in filter design. 05

OR

- (A) What are the different factors which contribute to output offset voltage in op-amp? Explain in detail the approach used to compensate one of these factors. 05
(B) Sketch op-amp based basic integrator circuit. Derive expression for output voltage to justify its operation of integration. 05

*****All The Best*****

KADI SARVA VISHWAVIDYALAYA

B.E. SEMESTER V EXAMINATION DECEMBER – 2015

SUBJECT CODE: EC-505

SUBJECT NAME: INTEGRATED CIRCUITS & APPLICATIONS

DATE: 28/11/2015

TIME: 10:30 TO 1:30

TOTAL MARKS: 70

Instructions:

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are compulsory.
4. Indicate **clearly**, the options you attempted along with its respective question number.
5. Use the last page of main supplementary for rough work.

Section – 1

Que. 1	(All Compulsory.)		
	(A)	What is OPAMP? Explain with block diagram and pin diagram.	(5)
	(B)	What are ideal conditions of OPAMP? Explain Ideal voltage transfer curve of OPAMP.	(5)
	(C)	How does the negative feedback affect the performance of an OPAMP? For the inverting amplifier using IC741 derive the closed loop parameters A_f , R_{if} , R_{of} , f_f & V_{ooT} .	(5)
	OR		
	(C)	The Noninverting amplifier using OPAMP has $R_1=400\Omega$ and $R_f = 4K\Omega$ the OPAMP used has following parameters, $A=3,00,000$, $R_i=42M\Omega$, $R_o=70\Omega$, $UGB=0.7$ MHz, Supply voltages=+/- 15volt, maximum output voltage swing= +/- 13volt. Determine the closed loop parameters A_f , R_{if} , R_{of} , f_f & V_{ooT} .	(5)
Que. 2			
	(A)	Define the following terms relating to OPAMP. 1. Input offset voltage, 2. Input offset current, 3. Input bias current, 4. CMRR, 5. Slew Rate, 6. SVRR, 7. PSRR, 8. Open loop voltage gain.	(5)
	(B)	What are the causes of slew rate? Find the maximum frequency for sine wave output voltage of 10V peak with an OPAMP whose slew rate is 1 V/ μ sec.	(5)
	OR		
	(A)	Draw & explain the differentiator circuit using OPAMP? Also explain the practical differentiator.	(5)
	(B)	Design an OPAMP circuit to perform the following linear operation, $V_O=10V_1 - 5V_2 - 2V_3$.	(5)
Que. 3			
	(A)	Draw the circuit of instrumentation amplifier and derive the equation for the output. What are the requirements for instrumentation amplifier? List out any two applications of instrumentation amplifier.	(5)
	(B)	Explain the operation of Clipper circuit using OPAMP?	(5)
	OR		
	(A)	Explain the operation of Schmitt trigger using OPAMP?	(5)
	(B)	Explain the operation of full wave rectifier using OPAMP?	(5)

Section – 2

Que. 4	(All Compulsory.)	
	(A)	What is filter? What are types of filter? What are applications of filter? (5)
	(B)	Draw the circuit of first order low pass Butterworth filter & explain the frequency response. (5)
	(C)	Design a second order high pass Butterworth filter with cutoff frequency 12 KHz. (5)
	OR	
	(C)	Write a note on Deliyannis Friend circuit filter. (5)
Que. 5	Answer the following questions.	
	(A)	Explain working of Timer IC555 with suitable diagram? (5)
	(B)	Explain Timer IC 555 as a Monostable multivibrator. (5)
	OR	
	(A)	Draw & explain the block diagram of PLL. (5)
	(B)	Write a short note on switching regulator. (5)
Que. 6	Answer the following questions.	
	(A)	What is mean by regulator? Explain various types of regulator with suitable diagram. (5)
	(B)	Explain PLL as a frequency multiplier. (5)
	OR	
	(A)	Write a note on monolithic power amplifier (LM 380). (5)
	(B)	Write a note on Square wave generator using Timer IC 555. (5)

ALL THE BEST