

B.E. DEGREE EXAMINATIONS: APRIL / MAY 2009

Fourth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING**U07EC404 Linear Integrated Circuits****Time: Three Hours****Maximum Marks: 100****Answer ALL the Questions:-****PART A (20 x 1 = 20 Marks)**

1. Band gap reference is
 - a) sum of V_{BE} voltage and ΔV_{BE} voltage
 - b) sum of CTAT voltage and PTAT voltage
 - c) sum of PTAT voltage and ΔV_{BE} voltage
 - d) sum of CTAT voltage and V_{BE} voltage
2. Slew rate of IC741C is
 - a) $0.6 \text{ V}/\mu\text{s}$
 - b) $0.5 \text{ V}/\mu\text{s}$
 - c) $1 \text{ V}/\mu\text{s}$
 - d) $0.7 \text{ V}/\mu\text{s}$
3. In pole-zero compensation,
 - a) zero is chosen at f_1 and pole at f_2
 - b) pole is chosen at f_1 and zero at f_2
 - c) zero is chosen at f_1
 - d) pole is chosen at f_1
4. Mark the wrong statement
The ideal op-amp has
 - a) Infinite input impedance
 - b) Infinite output impedance
 - c) Infinite open loop voltage gain
 - d) Infinite bandwidth
5. An amplifier with a gain of -10dB and input resistance of $10\text{k}\Omega$ has a feedback resistance of
 - a) $10 \text{ k}\Omega$
 - b) $1 \text{ k}\Omega$
 - c) $100 \text{ k}\Omega$
 - d) $1000 \text{ k}\Omega$
6. The unity gain circuit of op-amp has
 - a) high output impedance
 - b) low output impedance
 - c) infinite output impedance
 - d) zero output impedance
7. In a current to voltage converter, the resistor R_f in parallel with C_f
 - a) increase high frequency noise
 - b) increase the circuit oscillation
 - c) reduce high frequency noise
 - d) detect the high frequency noise
8. Precision diode can rectify the voltages at about
 - a) $60 \mu\text{V}$
 - b) $6 \mu\text{V}$
 - c) $6 \mu\text{V}$
 - d) 6 V

9. The range of frequencies over which PLL can acquire lock with an input signal is called
- a) tracking range b) lock-in range c) capture range d) pull-in time
10. The voltage controlled oscillator can generate
- a) sine voltage and triangular voltage
b) triangular and square wave voltage
c) square wave and saw tooth voltage
d) saw tooth and sine voltage
11. The signal range of FSK demodulator using PLL for tele-typewriter
- a) 1070 Hz and 1270 Hz b) 1050 Hz and 1250 Hz
c) 1000 Hz and 1070 Hz d) 1050 Hz and 1270 Hz
12. Frequency synthesizer is a circuit which can be used as
- a) Frequency multiplier b) Frequency divider
c) FSK modulator d) FSK demodulator
13. For an input binary number of 0110, the output voltage of a D/A converter whose Output range is 0 to 10V is
- a) 4 V b) 3.75 V c) 4.75 V d) 3 V
14. The fastest and most expensive technique of ADC is
- a) successive approximation ADC b) flash type ADC
c) Dual slope ADC d) Integrating type ADC
15. The resolution of an 8-bit ADC for an input voltage range of 10V is
- a) 39 mV b) 39.42 mV c) 39.22 mV d) 39.32 mV
16. The number of comparators required for realizing a 4 bit flash A/D converter is
- a) 16 b) 15 c) 4 d) 64
17. In the monostable multivibrator using IC555, given $R = 100\text{k}\Omega$ and $T = 100\text{ms}$, the value of C is
- a) $0.9\ \mu\text{F}$ b) $9\ \mu\text{F}$ c) $1\ \mu\text{F}$ d) $0.1\ \mu\text{F}$
18. Astable multivibrator has a duty cycle of
- a) $R_B / (R_A + 2R_B)$ b) $R_B / (R_A + R_B)$ c) $R_A / (R_A + 2R_B)$ d) $R_A / (R_A + R_B)$
19. Mark the wrong statement. In the series voltage regulator
- a) The input step-down transformer is bulky
b) Has large value of filter capacitor
c) Has low efficiency
d) Low power dissipation

20. Switched capacitor filter is a

- a) two terminal device with capacitor, switches and op-amp.
- b) three terminal device with capacitor, switches, resistors and op-amp.
- c) two terminal device with capacitor, switches and RC circuit.
- d) three terminal device with capacitor, switches and op-amp.

PART B (5 x 16 = 80 Marks)

21. a) Draw the circuit of a differential amplifier with current mirror load. Draw its equivalent circuit and derive an expression for its gain.

(OR)

21. b) (i) Compare ideal characteristics of an op-amp with practical characteristics. (6)

(ii) Explain in detail the different types of frequency compensation techniques applied to op-amp circuits. (10)

22. a) Derive the expression for the frequency of oscillation and gain of an RC phase shift oscillator using op-amp.

(OR)

22. b) (i) Explain in detail about the Astable multivibrator and derive the expression for the frequency of oscillation. (10)

(ii) Discuss in detail about Schmitt trigger circuit. (6)

23. a) (i) With circuit diagram explain the working of variable transconductance multiplier. What is its limitation? (10)

(ii) Draw the block diagram of a PLL and derive an expression for its closed loop. (6)

(OR)

23. b) (i) With neat sketch derive the expression of voltage controlled oscillator. (8)

(ii) Explain the application of PLL in FSK modulator and frequency synthesizer. (8)

24. a) (i) Draw the circuit of a R-2R ladder type digital to analog converter and explain. (8)

(ii) Draw the circuit of a four bit R-2R D/A converter with feedback resistance of $3R$ for the op-amp. Calculate its output voltage for a digital input of 1000 if the reference voltage is 4V. (8)

(OR)

24. b)(i) Explain the working of flash analog to digital converter. (8)

(ii) Explain the working of high speed sample and hold circuit. (8)

25. a)(i) With circuit diagram explain the working principle of IC 723 voltage regulator. (8)

(ii) Explain the working principle of IC tuned amplifier. (8)

(OR)

25. b) Draw the internal block diagram of NE 555 timer IC and explain how it can be used as monostable multivibrator. Derive an expression for its pulse width.
