

September 2021

ANALOG ELECTRONICS – II

Time Allowed: 1.5 Hours

Full Marks: 70

Answer to Question No.1 is compulsory and Answer any two questions from the rest.

1. Choose the correct answer from the given alternatives (any twenty): 2x20
- i) Which of the following parameter increases in case of double tuned amplifier compared to single tuned amplifier? – (a) selectivity, (b) bandwidth, (c) gain, (d) none of these.
 - ii) IF amplifier of super heterodyne receiver is – (a) audio amplifier, (b) single tuned amplifier, (c) video amplifier, (d) double tuned amplifier.
 - iii) The feedback fraction β – (a) is always less than 1, (b) is usually greater than 1, (c) may equal 1, (d) may not equal 1.
 - iv) In feedback amplifier, sensitivity D is equal to – (a) $A\beta$, (b) $1-A\beta$, (c) $1+A\beta$, (d) $1/(A\beta+1)$.
 - v) In a negative feedback amplifier using voltage series feedback – (a) R_i decreases and R_o decrease, (b) R_i decreases and R_o increases, (c) R_i increases and R_o decreases, (d) R_i increases and R_o increases.
 - vi) A zero-level detector is a – (a) comparator with sine-wave output, (b) comparator with a trip point referenced to zero, (c) peak detector, (d) limiter.
 - vii) If the input to a comparator is a sine wave, the output is a – (a) ramp voltage, (b) sine wave, (c) rectangular wave, (d) sawtooth wave.
 - viii) When both input signals are the same, a common signal element due to the two inputs can be defined as the _____ of the two signals – (a) difference, (b) sum, (c) average of the sum, (d) product.
 - ix) In ideal OP-AMP slew rate is – (a) 0, (b) 1, (c) 100, (d) infinite.
 - x) Characteristics of virtual ground is – (a) 0 voltage and 0 current sink, (b) 0 voltage and infinite current sink, (c) infinite voltage and 0 current sink, (d) none.
 - xi) A differential amplifier is used in the input stage of an OP-AMP to provide with a very high – (a) CMRR, (b) bandwidth, (c) slew rate, (d) open-loop gain.
 - xii) The voltage follower is commonly used as – (a) switch, (b) isolator, (c) regulator, (d) multiplier.
 - xiii) Wien-bridge oscillator can typically generate frequencies in the range of – (a) 1kHz – 1 MHz, (b) 1 MHz – 10MHz, (c) 10 MHz – 100 MHz, (d) 100 MHz – 150 MHz.
 - xiv) An oscillator is basically an amplifier with – (a) zero gain, (b) very large gain, (c) very low gain, (d) none of these.
 - xv) In an R-C phase shift oscillator, the minimum number of RC networks to be connected in cascade is – (a) one, (b) two, (c) three, (d) four.

- xvi) How can a monostable multivibrator be modified into a linear ramp generator? –
(a) Connect a constant current source to trigger input, (b) Connect to a constant current source to trigger output, (c) Replace resistor by constant voltage source, (d) Replace resistor by constant current source.
- xvii) Schmitt trigger is also known as – (a) Squaring circuit, (b) Blocking Oscillator, (c) Sweep circuit, (d) Astable multivibrator.
- xviii) Which one of the following multivibrator does not require input clock pulse or trigger? –
(a) monostable, (b) bistable, (c) astable, (d) flip-flop.
- xix) Bootstrap circuit is an example of – (a) emitter follower, (b) Darlington pair, (c) cascade amplifier, (d) none of these.
- xx) A current time base circuit must have – (a) diode, (b) transistor, (c) capacitor, (d) inductor.
- xxi) Voltage time-base circuit finds a major application in – (a) CRO, (b) TV, (c) RADAR, (d) FM Radio.
- xxii) IC 555 is a – (a) Digital IC, (b) Linear IC, (c) Memory Chip, (d) Register.
- xxiii) Ultraviolet radiation is used in IC fabrication process for – (a) diffusion, (b) masking, (c) isolation, (d) metalization.
- xxiv) In IC-fabrication process, the polymerised photoresist is removed or stripped with a chemical solvent such as – (a) hydrofluoric acid, (b) hot H₂SO₄, (c) trichloro ethylene, (d) hot water vapour.
- xxv) The tuned amplifier cannot be used for – (a) AF range, (b) RF range, (c) both a & b, (d) none of these.
2. a) Explain the operation of Hartley Oscillator with necessary circuit diagram. What will be the frequency of such oscillator? <https://www.wbscteonline.com>
b) Explain the operation of phase shift oscillator with necessary circuit diagram and find out the frequency of oscillation. 7.5+7.5
3. a) What is Piezo-electric effect? Discuss the principle of a Crystal Oscillator. What is the range of frequency of normal operation of it?
b) Derive the condition for sustained oscillation. (3+6+2)+4
4. a) What is Timer? Draw the internal Block diagram of IC555 Timer.
b) Explain the operation of monostable multivibrator using IC555. (3+6)+6
5. a) What is Miller sweep circuit? Briefly explain the operation of Bootstrap Sweep circuit with suitable diagram.
b) Why time base generators are called sweep circuits? (3+9)+3
6. a) What is the difference between Voltage time base and current time base generator?
b) Explain the operation of Miller sweep circuit. 7+8
7. a) Discuss the different ways by which the diode structure can be realized in IC?
b) Why inductors are not used in integrated circuit? 10+5
8. Describe the processes of – (a) epitaxial growth, (b) oxidation, (c) photolithography, and (d) ion implantation, in connection with IC fabrication. 4+4+4+3
9. Draw the circuit diagram and explain the operation of single tuned amplifier. What are the differences between single tuned and double tuned amplifier? 8+7

10. a) With the help of necessary diagram briefly explain current series feedback amplifier. 7.5+7.5
b) How does negative feedback reduce distortion in an amplifier?
11. a) Write down the ideal characteristics of OPAMP.
b) What is slew rate and why it is important?
c) Explain the term Input Offset Voltage and Output Offset Voltage. 5+5+5
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