

March 2021

ANALOG ELECTRONICS – I

Time Allowed: 3 Hours

Full Marks: 70

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

1. Choose the correct answer from the given alternatives (any twenty): 1x20
- i) What happens if the input voltage is higher than reference voltage in a positive clipper? – (a) Output voltage = Reference voltage (b) Output voltage = DC Positive voltage (c) Output voltage = Input voltage (d) All of the mentioned.
 - ii) A transistor series regulator is called emitter-follower regulator because the emitter of the pass transistor follows the – (a) output voltage (b) input voltage (c) base voltage (d) collector voltage.
 - iii) Bleeder resistors – (a) Are connected across the capacitor in a power supply (b) Keep a transistor from drawing too much current (c) Prevent an amplifier from being overdriven (d) Optimize the efficiency of an amplifier.
 - iv) If peak voltage of a half wave rectifier circuit is 5V and diode cut-in voltage is 0.7, then peak inverse voltage on diode will be – (a) 5.7V (b) 3.6V (c) 4.3V (d) 5V.
 - v) The output impedance of a transistor connected in _____ arrangement is the highest – (a) common emitter (b) common base (c) common collector (d) both (a)and (b).
 - vi) Improper biasing of a transistor circuit leads to-(a) excessive heat production at collector terminal (b) distortion in output signal (c) faulty location of load line (d) heavy loading of emitter terminal.
 - vii) If a transistor is operated in such a way that output current flows for 60° of the input signal, then it is _____ operation – (a) class A (b) class B (c) class C (d) none of these.
 - viii) In a JFET drain current is maximum when V_{GS} is – (a) zero (b) negative (c) positive (d) none.
 - ix) When a multistage amplifier is to amplify D.C. signal, then one must use –(a) RC (b) Transformer (c) Direct (d) None of these.
 - x) If two stages of a cascaded amplifier have decibel gains of 50 and 30, then overall gain is – (a) 80 dB (b) 1500 dB (c) 2 dB (d) none of these.
 - xi) For small values of drain-to-source voltage, JFET behaves like a – (a) resistor (b) constant current source (c) constant voltage source (d) negative resistance.
 - xii) In a linear IC voltage regulator, series pass transistor always operates in _____ region. – (a) Active (b) Saturation (c) Cut-off (d) None of these.
 - xiii) The h-parameters of a transistor depend on its – (a) configuration (b) operation point (c) temperature (d) all of the above.
 - xiv) Peak voltage of transformer secondary for voltage doubler that provides an output of 200 V is – (a) 50V (b) 100V (c) 150V (d) 200V.
 - xv) A UJT has $R_{BB}=10K$ and $R_{B2}=3k$, its intrinsic stand-off ratio is – (a) 0.7 (b) 0.5 (c) 0.8 (d) none.

- xvi) A Varactor diode –(a)has variable capacitance (b) utilizes transition capacitance of a junction(c)has always a uniform doping profile (d) is often used as an automatic frequency controldevice.
- xvii) A diode that has no depletion layers and operates with hot carriers is called – (a) Schottky (b) Varactor (c) Recovery (d) PIN.
- xviii) The basic purpose of a filter is to – (a) Minimize variations in a.c. input signal (b) Suppress harmonics in rectified output (c) Remove ripples from the rectified output (d) Stabilize d.c. output voltage.
- xix) In a Zener diode with high breakdown voltage – (a) both P and N are heavily doped (b) both P and N are lightly doped (c) either P or N is lightly doped (d) none of these .
- xx) As the temperature of a transistor goes up, the base-emitter resistance – (a) decreases (b) increases (c) remains the same (d) none of the above.
- xxi) The controlling parameter in MOSFET is – (a) V_{ds} (b) I_g (c) V_{gs} (d) I_s .
- xxii) Metallic crystal structure contains only one current named as – (a) hole current (b) non conventional current (c) electron current (d) conventional current.
2. Define stability factor. Explain the operation of Emitter feedback bias with the help of circuit diagram. What is the basic difference of AC load line and DC load line? 2+6+2
3. What is bias compensation circuit? Explain physically why the stability of the collector feedback bias circuit is better than a fixed bias circuit. What is current mirror bias? 3+4+3
4. State the differences between BJT and JFET. Draw the V–I characteristics of JFET. What is pinch-offvoltage? Write two important limitations of MOSFET. 3+3+2+2
5. Differentiate between voltage & power amplifier. Briefly explain the operation of Transformer coupled class-A power amplifier with the help of neat circuit diagram and deduce the expression of its efficiency. 2+(2+3+3)
6. Explain with the help of circuit diagram the operation of shunt regulator using transistor. What is IC regulator? What is voltage doubler? 4+2+4
7. For a full wave rectifier calculate –(a) Ripple factor and (b) Rectifier efficiency. Consider sinusoidal wave.What is meant by the term ‘voltage regulation’? What is the function of bleeder resistor? 6+2+2
8. Draw and label the V- I characteristic of a PN diode. Explain briefly the working principle of Schottky diode. What is junction capacitance? What is diffusion current? 3+3+2+2
9. Draw the typical input and output characteristic of a p-n-p transistor in common emitter configuration and explain the term ‘saturation region’. Briefly explain the working principle of biased clipper circuit with necessary circuit diagram. (4+2)+4
10. Define peak point and valley point of V-I characteristics of UJT. What is meant by multistage transistor amplifier? Why the term “complementary” is associated with CMOS? Make a comparative study among different types of cascading network. 3+2+2+3
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