



BRAINWARE UNIVERSITY
Term End Examination 2020 - 21
Programme – Diploma in Electrical Engineering
Course Name – Basic Electronics
Course Code - DEE303

Semester / Year - Semester III

Time allotted : 75 Minutes

Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 60=60

1. (Answer any Sixty)

(i) A p-n junction diode's dynamic conductance is directly proportional to

- | | |
|------------------------|--------------------|
| a) The applied voltage | b) The temperature |
| c) Its current | d) None of these |

(ii)

A diode whose terminal characteristics are related as $I = I_s e^{V/V_T}$ (I_s is the reverse saturation current, and V_T is the thermal voltage(=25mV)) is biased at $i = 2\text{mA}$.

Its dynamic resistance is

- | | |
|-----------|-------------|
| a) 25 ohm | b) 12.5 ohm |
| c) 50 ohm | d) 100 ohm |

(iii) The band gap of semiconductor lies in the range

- | | |
|-------------------|---------------------|
| a) 5 to 10 eV | b) 0.2 to 2.5 eV |
| c) 0.01 to 0.1 eV | d) 0.001 to 0.09 eV |

(iv) The depletion layer width of a p-n diode is about

- | | |
|----------------------|-----------|
| a) 0.5 cm | b) 0.5 mm |
| c) 0.5 μm | d) 0.5 nm |

(v) The junction capacitance of a p-n diode is used in

- a) Varactor diode
- b) Photo diode
- c) Zener diode
- d) Tunnel diode

(vi) In the saturation region of a transistor operating in CE mode

- a) Emitter junction is forward biased and collector junction is reverse biased
- b) Both emitter and collector junctions are forward biased
- c) Both emitter and collector junctions are reverse biased
- d) None of these

(vii) If FET operates in cut-off, the depletion layers are

- a) Touching each other
- b) Close together
- c) Far apart
- d) None of these

(viii) The donor impurities

- a) Generate electrons
- b) Generate holes
- c) Generate hole and electrons
- d) All of these

(ix) Which of the following is method to model a diode's forward characteristics?

- a) Iteration method
- b) Graphical method
- c) Constant-voltage drop model
- d) All of the mentioned

(x) When a forward biased is applied to a diode, the electrons enter to which region of the diode?

- a) P-region
- b) N-region
- c) P-n junction
- d) Metal side

(xi) Which of the following can be used in series with a Zener diode so that combination has almost zero temperature coefficient?

- a) Diode
- b) Resistor
- c) Transistor
- d) MOSFET

(xii) Zener diodes can be effectively used in voltage regulator. However, they are these days being replaced by more efficient

- a) Operational Amplifier
- b) MOSFET
- c) Integrated Circuits
- d) None of these

(xiii) What is the left hand section of a junction transistor called?

- a) Base
- b) Collector
- c) Depletion region
- d) Emitter

(xiv) Which of the following are true for a PNP transistor?

- a) The emitter current is less than the collector current
- b) The collector current is less than the emitter current
- c) The electrons are majority charge carriers
- d) The holes are the minority charge carriers

(xv) When does the transistor act like an open switch?

- a) Cut off region
- b) Active region
- c) Saturated region
- d) None of these

(xvi) The emitter current consists of

- a) Carriers passing from collector to emitter
- b) Carriers passing from base to collector
- c) Carriers passing from emitter to base
- d) None of these

(xvii) The AC current gain in a common base configuration is

- a)
- b)

$-\Delta I_C / \Delta I_E$

$\Delta I_C / \Delta I_E$

- c)
- d)

$\Delta I_E / \Delta I_C$

$-\Delta I_E / \Delta I_C$

(xviii) The output resistance of transistor is given by

a)

$$\Delta V_{CE} / \Delta I_B$$

b)

$$\Delta V_{BE} / \Delta I_B$$

c)

$$\Delta V_{BE} / \Delta I_C$$

d)

$$\Delta V_{CE} / \Delta I_C$$

(xix) Recombination happens when

a) A valance electron jumps to conduction band from valence band

b) An electron falls into a hole

c) A positive ion and a negative ion bind together

d) All of these

(xx) The most commonly used semiconductor material in manufacturing of electronic devices is

a) Silicon

b) Boron

c) Germanium

d) Gallium arsenide

(xxi) When pentavalent impurities like phosphor are added to an intrinsic semiconductor, it becomes a/an

a) P-type semiconductor

b) N-type semiconductor

c) PN-junction

d) All of these

(xxii) The depletion region of a PN-junction is formed

a) Just after the manufacture of the PN-junction

b) When forward-bias voltage is applied

c) When reverse-bias voltage is applied

d) All of these

(xxiii) The knee voltage of an Si diode is

- a) 0.3V
- b) 0.5V
- c) 0.7V
- d) 0.8V

(xxiv) The reverse saturation current of a PN-junction diode is

- a) Increased with temperature
- b) Decreased with temperature
- c) Inversely proportional with temperature
- d) Independent of temperature

(xxv) Reverse saturation current in a silicon PN-junction diode is doubled for every

- a) 10^0 c increase in temperature
- b) 5^0 c increase in temperature
- c) 2^0 c increase in temperature
- d) 1^0 c increase in temperature

(xxvi) Light-emitting diode is made by

- a) GaAs
- b) Si
- c) Ge
- d) Combination of Si and Ge

(xxvii) A voltage regulator is a circuit which can be used

- a) To convert the ac voltage to dc voltage
- b) To provide a constant dc output voltage in spite of the fluctuations in ac input voltage or load current
- c) To regulate the ac input voltage
- d) All of these

(xxviii) Early effect in a transistor is known as

- a) Zener breakdown
- b) Avalanche breakdown
- c) Thermal breakdown
- d) Reduction in width of base or base narrowing

(xxix) The value of β in a bipolar junction transistor is

- a) 0.95 to 0.998
- b) 0.45 to 0.498
- c) 1.95 to 1.998
- d) -0.95 to -0.998

(xxx) Which of the following transistor configuration is less dependent on temperature?

- a) Common base
- b) Common collector
- c) Common emitter
- d) All of these

(xxxi) An operational amplifier possesses

- a) Very large input resistance and very large output resistance
- b) Very large input resistance and very small output resistance
- c) Very small input resistance and very small output resistance
- d) Very small input resistance and very large output resistance.

(xxxii) An operational amplifier has an open-loop gain of 200,000. Its output exhibits saturation at 10V. The threshold differential voltage of the amplifier is

- a) 25 microvolt
- b) 50 microvolt
- c) 0.5 mV
- d) 10V

(xxxiii)

An op-amp has a common mode gain of 0.01 and a differential mode gain of 10^5 . Its CMRR would be

- a) 10^{-7}
- b) 10^{-3}
- c) 10^3
- d) 10^7

(xxxiv) If the differential voltage gain and the common mode voltage gain of a differential amplifier are 48dB and 2 dB respectively, then its common mode

rejection ratio is

- a) 23dB
- b) 25dB
- c) 46dB
- d) 50dB

(xxxv) The output of a certain op-amp circuit changes by 20 V in 4 microsecond. Its slew rate is

- a) 50 V/microsecond
- b) 500 mV/microsecond
- c) 5 V/microsecond
- d) 500 V/microsecond

(xxxvi) In a single stage R-C coupled amplifier, what are the phase shifts introduced at lower and upper 3 dB frequencies respectively?

- a) 45° , 225°
- b) 45° , 135°
- c) 90° , 180°
- d) 45° , 180°

(xxxvii) An ideal OP AMP has

- a) Infinite input impedance
- b) Zero output impedance
- c) Infinite voltage gain
- d) All of these

(xxxviii) The open loop voltage gain of an OPAMP is

- a) Small
- b) Large
- c) Can be anything
- d) Unity

(xxxix) If the input is a rectangular pulse, the output of an integrator is

- a) sine wave
- b) square wave
- c) ramp
- d) rectangular wave

(xl) The input resistance of 741 OPAMP is

- a) 100 ohm
- b) approx. 20 Kilo ohm

c) approx. 2 Mega ohm

d) 20 Mega ohm

(xli) Current can not flow to ground through

a) a mechanical ground

b) an AC ground

c) a virtual ground

d) an ordinary ground

(xlii) In oscillator actually does not generate energy bit merely convert the energy available from

a) DC biasing source

b) active device

c) mechanical input

d) none of these

(xliii) Which one of the following statements with reference to effective mass is incorrect?

a) It is a function of wave vector K .

b) It can be positive or negative.

c) It is different from free mass because of lattice interaction.

d) Its concept is applicable only to electrons and not to holes.

(xliv) In a semiconductor diode schematic symbol, arrow head represents

a) N-type material

b) P-type material

c) Both p and n-type material

d) None of these

(xlv) Avalanche multiplication

a) Disruption of covalent bonds occurs by collision

b) Direct rupture bonds

c) Both (Disruption of covalent bonds occurs by collision) and (Direct rupture bonds)

d) None of these

(xlvi) In p-n junction, the avalanche breakdown voltage with semiconductor resistivity

a) Decreases

b) Increases

c) Both the parameters are independent

d) Decreases or increases in abrupt p-n

junction

(xlvi) For heavily doped diode

- a) Zener breakdown is like to take place
- b) Avalanche breakdown is like to take place
- c) Either (Zener breakdown is like to take place) or (Avalanche breakdown is like to take place) will take place
- d) Neither (Zener breakdown is like to take place) nor (Avalanche breakdown is like to take place) will take place

(xlviii) The doping concentration on the n-side of a p-n junction diode is enhanced. Which one of the following will get affected?

- a) Width of the depletion region on n-side.
- b) Width of the depletion region on p-side.
- c) Width of the depletion region on both sides.
- d) No change in width of depletion regions.

(xlix) The reverse current of a silicon diode is:

- a) highly bias voltage sensitive
- b) highly temperature sensitive
- c) both bias voltage and temperature sensitive
- d) independent of bias voltage and temperature

(l) What is the typical value for the ratio of current in a p-n junction diode in the forward bias and that in the reverse bias?

- a) 1
- b) 10
- c) 100
- d) 1000

(li) The change in barrier potential of a silicon p-n junction with temperature is

- a) $0.025 \text{ V}/^\circ\text{C}$
- b) $0.250 \text{ V}/^\circ\text{C}$
- c) $0.030 \text{ V}/^\circ\text{C}$
- d) $0.014 \text{ V}/^\circ\text{C}$

(lii) At the cut-in voltage of a diode

- a) the potential barrier is overcome and the current through the junction starts to
- b) the potential barrier is strong and the current through the junction is blocked.

increase rapidly

- c) the diode almost behaves like a short d) Both (the potential barrier is overcome and the current through the junction starts to increase rapidly) and (the diode almost behaves like a short)

(liii) The junction capacitance of a p-n junction depends on

- a) doping concentrations only b) applied voltage only
c) both doping concentration and applied voltage d) barrier potential only

(liv) Zener diode is used as the main component in dc power supply for

- a) rectification b) voltage regulation
c) filter action d) both (rectification) and (voltage regulation)

(lv) The emitter of a transistor is generally doped the heaviest because it

- a) has to dissipate maximum power. b) has to supply the charge carriers.
c) is the first region of the transistor. d) must possess low resistance.

(lvi) Which of the following statements is correct?

- a) base region is of low resistivity material and heavily doped. b) collector region is of higher conductivity than emitter.
c) emitter region is of high resistivity material and lightly doped. d) emitter region is of high resistivity and heavily doped.

(lvii) In a properly biased n-p-n transistor, most of the electrons from the emitter

- a) pass to the collector through the base. b) recombine with holes in the base.
c) recombine with the hole in emitter itself. d) are stopped by the function barrier.

(lviii) The current I_{CBO} flows in the

- a) emitter and base leads
- c) emitter and collector leads

- b) collector and base leads
- d) none of these

(lix) In a junction transistor, the collector cut-off current 'ICBO' reduces considerably by doping the

- a) emitter with high level of impurity.
- c) collector with high level of impurity.

- b) emitter with low level of impurity.
- d) collector with low level of impurity.

(lx) In cut-off region in an n-p-n transistor

- a) VCB is +ve and VBE is -ve.
- c) both VCB and VBE are +ve.

- b) VCB is -ve and VBE is +ve.
- d) both VCB and VBE are -ve.