



BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Diploma in Electrical Engineering

Course Name – Basic Electronics

Course Code - DEE303

(Semester III)

Time : 1 Hr.15 Min.

Full Marks : 60

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question)

1 x 60=60

Choose the correct alternative from the following :

- (1) 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
- (2) If Zener breakdown voltage is V_z while avalanche break down voltage is V_a then
 - a) V_z greater than V_a
 - b) V_z less than V_a
 - c) $V_z = V_a$
 - d) None of these
- (3) For a p-n-p transistor in CE mode, $\beta=100$, then the value of α of the transistor is
 - a) 0.99
 - b) 0.099
 - c) 9.9
 - d) 99
- (4) The junction capacitance of a p-n diode is used in
 - a) Varactor diode
 - b) Photo diode
 - c) Zener diode
 - d) Tunnel diode
- (5) If the cut-in voltage of a Ge p-n diode is V_{r1} and that of Si p-n diode is V_{r2} then
 - a) $V_{r1} = V_{r2}$
 - b) V_{r1} greater than V_{r2}
 - c) V_{r1} less than V_{r2}
 - d) none of these
- (6) In active region of a transistor
 - a) Both emitter and collector junctions are reverse biased
 - b) Both emitter and collector junctions are reverse biased
 - c) Emitter junction is forward biased and collector junction is reverse biased
 - d) None of these

- for junction is reverse biased
- (7) If FET operates in cut-off, the depletion layers are
- Touching each other
 - Close together
 - Far apart
 - None of these
- (8) Which of the following devices is expected to have the highest input impedance
- MOSFET
 - BJT
 - JFET
 - none of these
- (9) The donor impurities
- Generate electrons
 - Generate holes
 - Generate hole and electrons
 - All of these
- (10) Which of the following is method to model a diode's forward characteristics?
- Iteration method
 - Graphical method
 - Constant-voltage drop model
 - All of the mentioned
- (11) If the positive terminal of the battery is connected to the anode of the diode, then it is known as
- Forward biased
 - Reverse biased
 - Equilibrium
 - Schottky barrier
- (12) If the voltage of the potential barrier is V_0 . A voltage V is applied to the input, at what moment will the barrier disappear?
- V less than V_0
 - $V = V_0$
 - V greater than V_0
 - V much less than V_0
- (13) The current in the diode is contributed by
- Majority carriers only
 - Minority carriers only
 - Both majority and minority carriers
 - None of these
- (14) Which of the following is true about the resistance of a Zener diode?
- It has an incremental resistance
 - It has dynamic resistance
 - The value of the resistance is the inverse of the slope of the i - v characteristics of the Zener diode
 - All of the mentioned
- (15) In Zener diode, for currents greater than the knee current, the V - I curve is almost
- Almost a straight line parallel to y -axis
 - Almost a straight line parallel to x -axis
 - Equally inclined to both the axes with a positive slope
 - Equally inclined to both the axes with a negative slope
- (16) The advantages of a junction transistor over the vacuum triode is
- High power consumption
 - High efficiency
 - Large size
 - Less doping
- (17) In an NPN transistor, the arrow is pointed towards
- The collector
 - The base
 - The emitter
 - Depends on the configuration
- (18) In the operation of an NPN transistor, the electrons cross which region?
- Emitter region
 - The region where there is high depletion
 - The region where there is low depletion
 - P type base region
- (19) When does the transistor act like an open switch?

- a) Cut off region
c) Saturated region
- b) Active region
d) None of these
- (20) The emitter current consists of
a) Carriers passing from collector to emitter
c) Carriers passing from emitter to base
- b) Carriers passing from base to collector
d) None of these
- (21) The AC current gain in a common base configuration is
a) $-\Delta I_C/\Delta I_E$
c) $\Delta I_E/\Delta I_C$
- b) $\Delta I_C/\Delta I_E$
d) $-\Delta I_E/\Delta I_C$
- (22) The base current amplification factor β is given by
a) I_C/I_B
c) I_E/I_B
- b) I_B/I_C
d) I_B/I_E
- (23) The application of a CC configured transistor is
a) voltage multiplier
c) Rectification
- b) Level shifter
d) Impedance matching
- (24) The input resistance of transistor is given by
a) $\Delta V_{CE}/\Delta I_B$
c) $\Delta V_{BE}/\Delta I_C$
- b) $\Delta V_{BE}/\Delta I_B$
d) $\Delta V_{BE}/\Delta I_E$
- (25) The electron-hole pairs in semi-conductor are generated by
a) Thermal agitation
c) Recombination
- b) Doping
d) Ionisation
- (26) Recombination happens when
a) A valance electron jumps to conduction band from valence band
c) A positive ion and a negative ion bind together
- b) An electron falls into a hole
d) All of these
- (27) The most commonly used semiconductor material in manufacturing of electronic devices is
a) Silicon
c) Germanium
- b) Boron
d) Gallium arsenide
- (28) When trivalent impurities just like aluminum are added to an intrinsic semiconductor, it becomes a/an
a) P-type semiconductor
c) PN-junction
- b) N-type semiconductor
d) All of these
- (29) In an N-type semiconductor, the position of the Fermi level lies
a) In the middle of the energy gap
c) Below the Centre of the energy gap
- b) Above the center of the energy gap
d) Anywhere in the energy gap
- (30) The unit of mobility of electrons is
a) $\text{cm}^2/\text{V-s}$
c) m^2/s
- b) $\text{cm}/\text{V-s}$
d) cm^2/V
- (31) The depletion region of a PN-junction is formed

- a) Just after the manufacture of the PN-junction
 c) When reverse-bias voltage is applied
- b) When forward-bias voltage is applied
 d) All of these
- (32) The knee voltage of an Si diode is
 a) 0.3V
 c) 0.7V
- b) 0.5V
 d) 0.8V
- (33) A silicon PN-junction diode is forward biased and thus it conducts. Then the voltage drop across the diode is about
 a) 0.3V
 c) 0.7V
- b) 0.5V
 d) 0.8V
- (34) Reverse saturation current in a silicon PN-junction diode is doubled for every
 a) 10°C increase in temperature
 c) 2°C increase in temperature
- b) 5°C increase in temperature
 d) 1°C increase in temperature
- (35) In a tunnel diode, current decreases due to
 a) Increase in voltage
 c) Constant voltage
- b) Decrease in voltage
 d) All of these
- (36) When a Zener diode is reverse biased
 a) To acts as a constant voltage source
 c) To regulate the ac input voltage
- b) To acts as a constant resistance
 d) All of these
- (37) The emitter region of a transistor is highly doped compared to base and collector region to
 a) Provide or supply charge carriers
 c) Dissipate maximum power
- b) Collect the charge carriers
 d) Provide minimum resistance
- (38) In a transistor, the reverse saturation current I_{co}
 a) Becomes doubled for each 10°C rise in temperature
 c) Becomes doubled for each 100°C rise in temperature
- b) Becomes doubled for each 50°C rise in temperature
 d) Becomes doubled for each 200°C rise in temperature
- (39) Which of the following transistor configuration is less dependent on temperature?
 a) Common base
 c) Common emitter
- b) Common collector
 d) All of these
- (40) With zero volt on both inputs, an op-amp ideally should have an output voltage equal to
 a) Positive supply voltage
 c) Zero
- b) Negative supply voltage
 d) CMRR
- (41) 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
 c) 0.5 mV
- b) 50 microvolt
 d) 10V
- (42) 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}
 c) 10^3
- b) 10^{-3}
 d) 10^7
- (43) 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
c) 46dB
- b) 25dB
d) 50dB
- (44) The output of a certain op-amp circuit changes by 20 V in 4 microsecond. Its slew rate is
- a) 50 V/microsecond
c) 5 V/microsecond
- b) 500 mV/microsecond
d) 500 V/microsecond
- (45) 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°
c) 90° , 180°
- b) 45° , 135°
d) 45° , 180°
- (46) The common mode rejection ratio of an OP AMP is
- a) Much smaller than unity
c) unity
- b) Much larger than unity
d) none of these
- (47) An ideal OP AMP has
- a) Infinite input impedance
c) Infinite voltage gain
- b) Zero output impedance
d) All of these
- (48) An OPAMP has
- a) Equal input and output resistance
c) Large input resistance and low output resistance
- b) Low input resistance and a large output resistance
d) None of these.
- (49) The number of pins of the IC741 OP-AMP is
- a) 10
c) 12
- b) 8
d) 16
- (50) If the input is a rectangular pulse, the output of an integrator is
- a) sine wave
c) ramp
- b) square wave
d) rectangular wave
- (51) The non-inverting amplifier has a
- a) large closed loop voltage gain
c) large closed loop input impedance
- b) small open loop voltage gain
d) large closed loop output impedance
- 52) The input resistance of 741 OPAMP is
- a) 100 ohm
c) approx. 2 Mega ohm
- b) approx. 20 Kilo ohm
d) 20 Mega ohm
- 3) When in a negative scaler, both R_1 and R_f are reduced to zero, the circuit functions as
- a) zero
c) large
- b) small
d) infinite
- 4) An electron device means the device in which the conduction of electrons takes place through
- a) A gas
c) A semiconductor
- b) Vacuum
d) A gas, semiconductor or vacuum
- i) In a semiconductor diode schematic symbol, arrow head represents
- a) N-type material
c) Both p and n-type material
- b) P-type material
d) None of these

(56) 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

(57) 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

(58) Consider the following statements for a p-n junction diode: i) It is an active component. ii) Depletion layer width decreases with forward biasing. iii) In the reverse biasing case, saturation current increases with increasing temperature. Which of the statements given above are corrects?

- a) i), ii) and iii)
- b) i) and ii) only
- c) ii) and iii) only
- d) i) and iii) only

(59) 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.

(60) Electron mobility and lifetime in a semiconductor at room temperature are respectively $0.36 \text{ m}^2/(\text{Vs})$ and $340 \mu\text{s}$. the diffusion length is

- a) 3.13 mm
- b) 1.77 mm
- c) 3.55 mm
- d) 3.13 cm