



BRAINWARE UNIVERSITY

Term End Examination 2020 - 21

Programme – Diploma in Electronics & Communication Engineering

Course Name – Analog Electronics I

Course Code - DECE302

Semester / Year - Semester III

Time allotted : 85 Minutes

Full Marks : 70

[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 70=70

1. (Answer any Seventy)

(i) Under normal conditions a diode conducts current when it is

- | | |
|-------------------|-------------------|
| a) reverse-biased | b) forward-biased |
| c) avalanched | d) saturated |

(ii) A diode conducts when it is forward-biased, and the anode is connected to the _____ through a limiting resistor

- | | |
|--------------------|--------------------|
| a) positive supply | b) negative supply |
| c) cathode | d) anode |

(iii) One eV is equal to _____ J

- | | |
|------------------------|------------------------|
| a) | b) |
| 6.02×10^{-23} | 1.6×10^{-19} |
| c) | d) |
| 6.25×10^{-18} | 1.66×10^{-24} |

(iv) Zener diodes with breakdown voltages less than 5 V operate predominantly in what type of breakdown?

- | | |
|--------------|-------------|
| a) avalanche | b) zener |
| c) varactor | d) Schottky |

(v) The Schottky diode is used

- a) in high-power circuits
- b) in circuits requiring negative resistance
- c) in very fast-switching circuits
- d) in power supply rectifiers

(vi) The voltage gain of a common collector configuration is

- a) Unity
- b) Zero
- c) Very high
- d) Moderate

(vii) Which of the following elements is most frequently used for doping pure Ge or Si:

- a) Boron
- b) Gallium
- c) Indium
- d) All of these

(viii) What type(s) of gate-to-source voltage(s) can a depletion MOSFET (D-MOSFET) operate with?

- a) zero
- b) positive
- c) negative
- d) any of these

(ix) For a half wave or full wave rectifier the Peak Inverse Voltage of the rectifier is always

- a) Greater than the input voltage
- b) Smaller than the input voltage
- c) Equal to the input voltage
- d) Greater than the input voltage for full wave rectifier and smaller for the half wave rectifier

(x) Bridge rectifier is an alternative for

- a) Full wave rectifier
- b) Peak rectifier
- c) Half wave rectifier
- d) None of these

(xi) Efficiency of a half wave rectifier is

- a) 50%
- b) 06%

c) 40.6%

d) 46%

(xii) Ripple factor of a half wave rectifier is _____

a) 1.414

b) 1.21

c) 0.482

d) 1.4

(xiii) Efficiency of a centre tapped full wave rectifier is _____

a) 50%

b) 81.2%

c) 46%

d) 70%

(xiv) Doping of a semiconductor material means

a) that a glue-type substance is added to hold the material together

b) that impurities are added to increase the resistance of the material

c) that impurities are added to decrease the resistance of the material

d) that all impurities are removed to get pure silicon

(xv) In ordinary diode, reverse breakdown is a condition in which a diode _____

a)

b) is reverse-biased and there is a small leakage current

is subjected to a large reverse voltage

c) has no current flowing at all

d) is heated up by large amounts of current in the forward direction

(xvi) In a center tapped full wave rectifier, the input sine wave is $250\sin 100t$. The output ripple frequency will be _____

a) 50Hz

b) 100Hz

c) 25Hz

d) 200Hz

(xvii) Number of diodes used in a full wave bridge rectifier is

a) 1

b) 2

c) 3

d) 4

(xviii) The thermal runaway is avoided in a self bias because

- a) of its independence of ?
- b) of the positive feedback produced by the emitter resistor
- c) of the negative feedback produced by the emitter resistor
- d) of its dependence of ?

(xix) What is the value of Stability factor for an ideal transistor?

- a) 100
- b) 1
- c) infinite
- d) 0

(xx) If a BJT is to be used as an amplifier, then it must operate in _____

- a) Cut-off mode
- b) Active mode
- c) Saturation mode
- d) All of these

(xxi) In an NPN transistor, the arrow is pointed towards

- a) The collector
- b) The base
- c) The emitter
- d) Depends on the configuration

(xxii) In Zener diode, for currents greater than the knee current, the V-I curve is almost

- a) Almost a straight line parallel to y-axis
- b) Almost a straight line parallel to x-axis
- c) Equally inclined to both the axes with a positive slope
- d) Equally inclined to both the axes with a negative slope

(xxiii) The advantages of a junction transistor over the vacuum triode is

- a) High power consumption
- b) High efficiency
- c) Large size
- d) Less doping

(xxiv) If the positive terminal of the battery is connected to the anode of the diode, then it is known as

- a) Forward biased
- b) Reverse biased

c) Equilibrium

d) Schottky barrier

(xxv) During reverse bias, a small current develops which is known as

a) Forward current

b) Reverse current

c) Reverse saturation current

d) Active current

(xxvi) 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

(xxvii) The current in the diode is contributed by

a) Majority carriers only

b) Minority carriers only

c) Both majority and minority carriers

d) None of these

(xxviii) In the operation of an NPN transistor, the electrons cross which region?

a) Emitter region

b) The region where there is high depletion

c) The region where there is low depletion

d) P type base region

(xxix) 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

(xxx) 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

(xxxi) 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

(xxxii) 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 reverse biased
- c) Both emitter and collector junctions are reverse biased
- d) None of these

(xxxiii) FET is advantageous over BJT since it is

- a) Thermally more stable
- b) It use one p-n junction
- c) It is a voltage controlled device
- d) None of these

(xxxiv) 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

(xxxv) A FET operates on

- a) Majority carriers only
- b) Minority carriers
- c) Positive and negative ions
- d) Positively charged ions

(xxxvi) Which of the following devices is expected to have the highest input impedance

- a) MOSFET
- b) BJT
- c) JFET
- d) none of these

(xxxvii) 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

(xxxviii) In a PNP transistor operating in active region, the main stream of current is

- a) Drift of holes
- b) Drift of electrons

c) Diffusion of holes

d) Diffusion of electrons

(xxxix) The input resistance of transistor is given by

a)

b)

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

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

c)

d)

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

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

(xl) Which configuration has the lowest current gain?

a) Common Base

b) Common Emitter

c) Common Collector

d) None of these

(xli) What type of coupling is generally used in power amplifiers?

a) Direct

b) RC

c) Transformer

d) Transistor

(xlii) In a class A amplifier, the output signal is

a) Distorted

b) Same as the input

c) Clipped

d) Smaller in amplitude than the input

(xliii) Comparing the size of BJT and FET, choose the correct statement?

a) BJT is larger than the FET

b) BJT is smaller than the FET

c) Both are of same size

d) Depends on application

(xliv) Which of the following statement is true about FET?

a) It has high output impedance

b) It has high input impedance

c) It has low input impedance

d) It does not offer any resistance

(xlv) In the saturation region of the MOSFET the saturation current is

- a) Independent of the voltage difference between the source and the drain
- b) Depends directly on the voltage difference between the source and the drain
- c) Depends directly on the overdriving voltage
- d) Depends directly on the voltage supplied to the gate terminal

(xlvi) For MOSFET is to be used as a switch then it must operate in

- a) Cut-off region
- b) Triode region
- c) Saturation region
- d) Both cut-off and triode region can be used

(xlvii) At channel pinch off

- a) The width of the induced channel becomes non linear
- b) The width of the induced channel becomes very large (resulting in very large resistance and very low, practically zero, current)
- c) width becomes $1/e$ times the maximum possible width
- d) The width of the induced channel becomes zero and the current saturates

(xlviii) The saturation current of the MOSFET is the value of the current when

- a) The voltage between the drain and drain becomes equal to the overdrive voltage
- b) The voltage between the drain and drain becomes equal to the threshold voltage
- c) The voltage between the drain and drain becomes equal to the voltage applied to the gate
- d) The voltage between the drain and drain becomes equal to difference the overdrive voltage and the threshold voltage

(xlix) What is the value of 1 micron?

- a) 10^{-6} cm
- b) 10^{-5} cm
- c) 10^{-4} cm
- d) 10^{-3} cm

(l) What is the disadvantage of a class B push-pull amplifier?

- a) The efficiency reduces
- b) The figure of merit increases
- c) The cross-over distortion occurs
- d) The Q-power dissipation is very large

(li) Read statements and select the correct option below. A: A push-pull amplifier decreases harmonic distortion B: Output has half-wave symmetry

- a) A and B are both correct and B is the correct reason for A
- b) A is correct and B is incorrect
- c) Both A and B are correct but B is not the correct reason for A
- d) Both A and B are incorrect

(lii) Which of these is incorrect for complementary symmetry push-pull amplifiers?

- a) During positive cycle NPN transistor conducts
- b) It is easier to fabricate on IC
- c) Size of the transformer required reduces
- d) Efficiency and figure of merit are same as transformer coupled push-pull amplifier

(liii)

For a Zener diode shunt regulator, the source current is I_S , the Zener diode current is I_Z and the load current is I_L . The source voltage is V_S , Zener voltage is V_Z and load voltage is V_L . The load resistance is R_L . What is the correct option for the safe operation of the diode?

- a) $I_S = I_Z + I_L$
- b) $I_S \leq I_{Zmax} + I_L$
- c) $I_S \leq I_{Zmin} + I_L$
- d) $V_L = V_Z$

(liv) What is line regulation?

- a) The process of keeping Zener diode
- b) The process of keeping load voltage

voltage constant inspite of changes in AC supply

c) The process of keeping load voltage constant irrespective of variations in source current

constant irrespective of the fluctuation in AC supply or the line voltage

d) The process of keeping Zener current constant irrespective of fluctuation in AC supply

(lv) What is load regulation?

a) The process of keeping the load voltage constant irrespective of any change in AC supply

c) The process of keeping load voltage constant irrespective of variations in source current

b) The process of keeping the load voltage constant irrespective of variations in load current

d) The process of keeping load current constant irrespective of variations in AC supply

(lvi) Which of these is a not drawback of Zener diode shunt regulator?

a) The output voltage is fixed

c) Variation in load current needs to be minimal

b) The output voltage can vary with temperature

d) It is difficult to design

(lvii) Which of the following configuration is used as input stage of multistage amplifier?

a) Common base configuration

c) Common collector configuration

b) Common emitter configuration

d) All configurations are equally suited

(lviii) Which of the following statement about a common collector transistor is true?

a) Very low input impedance

c) Unity current gain

b) Very high output impedance

d) Unity voltage gain

(lix) BJT is biased to _____

a) Work as a switch

b) Prevent thermal runaway

c) Increase DC collector current

d) Operate it in the saturation region

(Ix) Choose the incorrect option according to self bias circuit?

a) Voltage gain increases

b) Stability factor is independent of collector resistance

c) BJT can be used in either of the three configurations

d) Excellent stability in collector current is achieved

(Ixi) For any cascaded amplifier network, which of these are incorrect?

a) Cascading increases gain

b) Overall input resistance is equal to the input resistance of the first amplifier

c) The overall output resistance is less than the lowest output resistance in all amplifiers used

d) Loading effect occurs

(Ixii) It is provided that the lower cut-off frequency of an individual amplifier is 25Hz, find the net cut-off frequency of a cascaded network of 8 similar amplifiers.

a) 200 Hz

b) 83 Hz

c) 100 Hz

d) 25 Hz

(Ixiii) Given that the higher cut-off frequency of the cascaded network of 6 amplifiers is 2MHz, find the higher cut-off frequency of one amplifier, if all amplifiers are similar.

a) 5.7 MHz

b) 0.33 MHz

c) 12 MHz

d) 64 MHz

(Ixiv) The lower and upper cutoff frequencies of an amplifier are unknown. If originally, individual BW of such an amplifier is B_1 , and now the bandwidth of the cascaded network of 10 such amplifiers is B_2 , find B_2/B_1 .

a) 0.26

b) 3.84

c) Insufficient data

d) 5

(lxv) What are the small signal FET parameters?

a)

g_m and r_{ds}

c)

V_{ds} and r_{ds}

b)

g_m and V_{gs}

d)

g_m

(lxvi) Choose the incorrect statement for JFET(s).

a)

Maximum transconductance occurs at $V_{GS}=0$

c)

Transconductance increases linearly with I_{DS}

b)

Transconductance decreases linearly with V_{GS}

d)

Transconductance does not depend on V_{DS}

(lxvii) Using JFET, which of these has an output which follows input?

a) CS amplifier with a bypass capacitor

c) CG amplifier

b) CD amplifier(Source follower)

d) CS amplifier without a bypass capacitor

(lxviii)

The reverse saturation current of a diode at 25°C is $1.5 \times 10^{-9}\text{A}$. What will be reverse current at temperature 30°C ?

a)

$3 \times 10^{-9}\text{A}$

c)

$2.12 \times 10^{-9}\text{A}$

b)

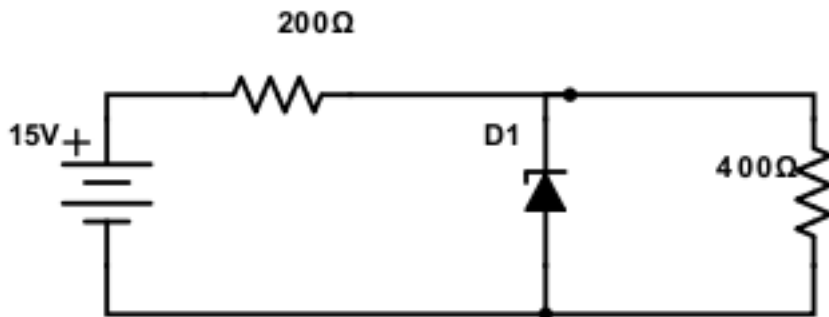
$2 \times 10^{-9}\text{A}$

d)

$1.5 \times 10^{-9}\text{A}$

(Ixix)

Find the power rating of the diode in the given circuit. The breakdown voltage of the diode is 5V.



a)

200 mW

c) 250 mW

b)

125 mW

d)

300 mW

(Ixx)

Transconductance of a FET is proportional to

a)

$$\sqrt{V_{DS}}$$

c)

$$\sqrt{I_{DS}}$$

b)

$$I_{DS}$$

d)

None of these