

**BRAINWARE UNIVERSITY****Term End Examination 2020 - 21****Programme – Bachelor of Technology in Computer Science & Engineering****Course Name – Analog Electronic Circuits****Course Code - ESC(CSE)301****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) In which of the following semiconductor, the concentration of the holes and electrons is equal?

- | | |
|--------------|--------------|
| a) Intrinsic | b) Extrinsic |
| c) Compound | d) Elemental |

(ii) In diffusion, the particles flow from a region of _____ concentration to region of _____ concentration.

- | | |
|-----------------|----------------|
| a) High, low | b) Low, high |
| c) High, medium | d) Low, medium |

(iii) Which of the following parameter can't be found with Hall Effect measurement?

- | | |
|--------------------------|-----------------------|
| a) Polarity | b) Conductivity |
| c) Carrier concentration | d) Area of the device |

(iv) 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 |

(v) During reverse bias in p-n junction diode, a small current develops, which

is known as

- a) Forward current
- b) Reverse current
- c) Reverse saturation current
- d) Active current

(vi) Which of the following parameters of P-N junction diode increases with temperature?

- a) Cut in voltage
- b) Reverse saturation current
- c) Ideality factor
- d) Resistance

(vii) What will be the approximate value of thermal voltage of diode?

- a) 26 mV at 300 K
- b) 30 mV at 180 K
- c) 26 mV at 180 K
- d) 30 mV at 300 K

(viii) 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

(ix) A simple diode rectifier has 'ripples' in the output wave which makes it unsuitable as a DC source. To overcome this one can use

- a) A capacitor in series with a the load resistance
- b) A capacitor in parallel to the load resistance
- c) Both A capacitor in series with a the load resistance and A capacitor in parallel to the load resistance situations will work
- d) None of these

(x) Which of the following is true for LEDs?

- a) The light emitted by a LED is inversely proportional to the current flowing through the diode
- b) LED operate in a manner opposite to the working of the optoelectronics or photodiodes

- c) LED cannot be used to generate coherent source of light d) None of these

(xi) Transformer utilization factor of a half wave rectifier is _____

- a) 0.234 b) 0.279
c) 0.287 d) 0.453

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

- a) 0.5 b) 0.46
c) 0.7 d) 0.8120000000000001

(xiii) In saturation region, the depletion layer

- a) increases linearly with carrier concentration b) decreases linearly with carrier concentration
c) increases by increasing the emitter current d) decreases by decreasing the emitter voltage drop

(xiv) If $A_d = 3500$ and $A_C = 0.35$, then the CMRR is

- a) 1225 b) 10000
c) 1226 d) None of these

(xv)

Consider the inverting OP-AMP with R_1 (input resistance) = $1k\Omega$, R_2 (feedback resistance) = $50k\Omega$ and power supply voltages $\pm 12V$. Find the output voltage for an input voltage $1V$.

- a) b)
-50V **+51V**
c) d)

+12V

-12V

(xvi)

Consider the non-inverting OP-AMP with R_1 (input resistance) = $1\text{k}\Omega$, R_2 (feedback resistance) = $10\text{k}\Omega$ and power supply voltages $\pm 12\text{V}$. Find the output voltage for an input voltage 0.05V .

a)

b)

-0.50V

+0.50V

c)

d)

+0.55V

-0.55V

(xvii) How to improve CMRR value

a) Increase common mode gain

b) Decrease common mode gain

c) Decrease Differential mode gain

d) None of these

(xviii) For NMOS transistor which of the following is not true?

a) The substrate is of p-type semiconductor b) Inversion layer or induced channel is of n type

c) Threshold voltage is negative

d) None of these

(xix) If a MOSFET is to be used in the making of an amplifier then it must work in

a) Cut-off region

b) Triode region

c) Saturation region

d) Both cut-off and triode region

(xx) What are the small signal FET parameters?

a)

g_m and r_{ds}

b)

g_m and V_{gs}

c)

V_{ds} and r_{ds}

d)

I_{ds}

(xxi) The threshold voltage is

a) Increases on increasing temperature

b) May increase or decrease on increasing temperature depending upon other factors

c) Temperature independent

d) Decreases on increasing temperature

(xxii) Find the relative change in gain with negative feedback given that return ratio is 24, and feedback factor is 3, when the change in open loop gain is 2.

a) 1

b) 1.6

c) 0.1

d) 0.01

(xxiii) The unwanted characteristics of amplifier output apart from the desired output is collectively termed as _____

a) Inefficiency

b) Damage

c) Fault

d) Distortion

(xxiv) Transistor in power amplifier is _____

a) An active device

b) A passive device

c) A op-amp

d) A voltage generating device

(xxv) Which of the following class have a theoretical efficiency of 50%?

- a) Class A
- b) Class C
- c) Class AB
- d) Class D

(xxvi) Which among the below stated transistors operate in an active region for the purpose of amplification?

- a) BJT
- b) E-MOSFET
- c) Both BJT and E-MOSFET
- d) None of these

(xxvii) Which of the following is true?

- a) CC amplifier has a large current gain
- b) CE amplifier has a large current gain
- c) CB amplifier has low voltage gain
- d) CC amplifier has low current gain

(xxviii) To produce significant forward current in a Si-diode the forward voltage must exceed

- a) 0.3V
- b) 0.7V
- c) 2 mV
- d) 26 mV

(xxix) The cut-in voltage of a Ge diode is about

- a) 0.2V
- b) 0.6V
- c) 0.2mV
- d) 0.6V

(xxx) The forbidden gap for silicon at 0K

- a) 0.78eV
- b) 1.2eV
- c) 1.5eV
- d) 1.8eV

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

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

(xxxiii) At 0K an intrinsic semiconductor behaves like

- a) Superconductor
- b) Perfect insulator
- c) n-type semiconductor
- d) p-type semiconductor

(xxxiii) Semiconductor suitable for light emitting diode is

- a) Si
- b) Ge
- c) GaAs
- d) C

(xxxiv) Which type of amplifiers exhibit the current gain approximately equal to unity without any current amplification?

- a) CE
- b) CC
- c) CB
- d) None of these

(xxxv) Sub-threshold current is basically a drain current that flows only when

- a) V_{GS} is slightly greater than V_T
- b) V_{GS} is slightly less than V_T
- c) V_{GS} is exactly equal to V_T
- d) None of these

(xxxvi) 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

(xxxvii) When a P-N junction is reverse-biased,

- a) Its depletion layer become narrow
- b) Its barrier potential decreased
- c) Its breaks
- d) It offers high resistance

(xxxviii) The outermost electrons of an atom are called electrons.

- a) Free
- b) Valence
- c) Conduction
- d) Bound

(xxxix) The main reason why electrons can tunnel through a P-N junction is that

- a) They have high energy
- b) Barrier potential is very low
- c) Depletion layer is extremely thin
- d) Impurity level is low

(xl) The d.c. output voltage of a bridge rectifier having a total secondary peak voltage of 100 V is volt.

- a) 63.6
- b) 31.8
- c) 90
- d) 70.7

(xli) When the E/B junction of a transistor is reverse-biased, collector current

- a) Is reversed
- b) Increases
- c) Decreases
- d) Stops

(xlii)

The current amplification factor alpha d.c. (α_{dc}) is given by

- a) I_C/I_E
- b) I_C/I_B
- c) I_B/I_E
- d) I_B/I_C

(xliii) The d.c. and a.c. load lines of a transistor

- a) Have equal slopes
- b) Have positive slopes
- c) Are curved lines
- d) Intersect each other

(xliv) The a.c. load line of a transistor circuit is steeper than its d.c. load line because

- a) a.c. signal sees less load resistance
- b) It has greater slope
- c) I_c is higher
- d) Input signal varies in magnitude.

(xlv) The maximum peak-to-peak output voltage swing is obtained when the Q-point of a circuit is located

- a) Near saturation point
- b) Near cut-off point
- c) At the Centre of the load line
- d) At least on the load line

(xlvi) The main factor which makes a MOSFET likely to break-down during normal handling is its

- a) Very low gate capacitance
- b) High leakage current
- c) High input resistance
- d) Both Very low gate capacitance and High input resistance

(xlvii)

In a JFET, drain current is maximum when V_{GS} is

- a) Zero
- b) Negative
- c) Positive
- d) Equal to V

(xlviii) FET's have similar properties to

- a) PNP transistors
- b) NPN transistors
- c) Thermionic valves
- d) Uni-junction transistors

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

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

(l) Crystals have a very

- a) low Q
- b) high Q
- c) small inductance
- d) large resistance

(li) For sustaining oscillations in an oscillator

- a) feedback factor should be unity
- b) phase shift should be zero
- c) feedback should be negative
- d) Both feedback factor should be unity and phase shift should be zero

(lii) 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

(liii) Transconductance of a JFET proportional to

- a)
- b)

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

$$I_{DS}$$

- c)
- d) None of these

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

(liv) Reverse saturation current of a p-n junction diode increases when the temperature.....

- a) decreases
- b) increases
- c) remains same
- d) none of these

(lv) A solar cell is made up of a

- a) PNP transistor
- b) NPN transistor
- c) LED
- d) PN junction

(lvi) Tunnel diode is also known asdiode after the name of its inventor.

- a) Berdeen
- b) Esaki
- c) Zener
- d) none of these

(lvii) An ideal OP-AMP hasCMRR.

- a) zero
- b) infinite
- c) low
- d) high

(lviii) Full form of MOSFET is

- a) Metal Oxygen Semiconductor Field Effect Transistor
- b) Metal Insulator Semiconductor Field Effect Transistor
- c) Metal Oxide Semiconductor Field Effect Transistor
- d) Multiple Oxygen Semiconductor Field Effect Transistor

(lix) There is a transparent layer at the top of device.

- a) P-N diode
- b) MOSFET
- c) Solar Cell
- d) Tunnel diode

(lx) The desirable line regulation by a zener diode is

- a) Higher
- b) Lower
- c) Medium
- d) all of these