BRAINWARE UNIVERSITY

Term End Examination 2023-2024
Programme – Diploma in Robotics & Automation-2022
Course Name – Electronic Devices and Circuits
Course Code - ECPC302
(Semester III)

Full Marks : 60

Time : 2:30 Hours

[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 15=15

1. *Choose the correct alternative from the following :*

(i)   Examine a common-source FET amplifier; the gate-source junction is typically:

a) Forward-biased
b) Reverse-biased
c) Floating
d) Short-circuited

(ii) Indicate the type of JFET that has a voltage-controlled resistor characteristic.

a) N-channel JFET
b) P-channel JFET
c) Depletion-mode JFET
d) Enhancement-mode JFET

(iii) Observe what the transconductance parameter (g_m) measures in an FET.

a) Voltage gain
b) Current gain
c) Power gain
d) Input-output resistance

(iv) Which FET parameter can relate to the slope of the transfer characteristics curve in the active region?

a) VDS
b) VGS(off)
c) gm
d) IDSS

(v)   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.

(vi) The common mode rejection ratio (CMRR) of a differential amplifier (where A_d = differential gain , A_c = common mode gain) is defined as

a) Ad/Ac
b) (Ad- Ac)/ Ad
c) 2 log 10 Ad/ Ac
d) 2 log e Ad/ Ac

(vii) Choose, which of the following statement about a common base transistor is true?

a) Very low input impedance
b) Very low output Impedance
c) Current gain is greater than unity
d) Voltage gain is very low

(viii) Define the basic construction of a Junction Field Effect Transistor (JFET).

a) P-N-P junction

b) N-P-N junction

c) N-N-N junction

d) P-P-P junction

(ix) Identify that for a JFET, the current flow between the drain and source is controlled by:

a) Voltage at the gate

b) Voltage at the source

c) Voltage at the drain

d) Current at the gate

(x) Select the appropriate answer for the gate terminal of a JFET, which is made of:

a) P-type material

b) N-type material

c) Metal

d) Insulator

(xi) Choose, which of the following configuration is used as input stage of the multistage amplifier?

a) Common base configuration

b) Common emitter configuration

c) Common collector configuration

d) All configurations are equally suited

(xii) The collector and emitter current levels for a transistor with common base dc current gain of 0.99 and base current of 20µA are respectively

a) 2mA and 1.98mA

b) 1.98µA and 2mA

c) 1.98mA and 2mA

d) 2mA and 1.98µA

(xiii) Select the correct answer from the following: 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

(xiv) Identify the primary purpose of biasing in a BJT circuit.

a) To amplify the input signal

b) To stabilize the operating point

c) To increase the power dissipation

d) To decrease the input impedance

(xv) Examine for a common-emitter configuration. The base-emitter junction is:

a) Forward-biased

b) Reverse-biased

c) Short-circuited

d) Open-circuited

Group-B
(Short Answer Type Questions)

3 x 5=15

2. Write down the advantages of MOSFET. (3)

3. When the VGS of JFET changes from -3.1V to -3V, the drain current changes from 1mA to 1.3mA. Calculate the value of transconductance. (3)

4. Write characteristics of an ideal op-amp. (3)

5. List the various types of amplifiers. (3)

6. Distinguish between series and shunt feedback amplifiers. (3)

OR

Conclude the nature of input and output resistance in negative feedback. (3)

Group-C
(Long Answer Type Questions)

5 x 6=30

7. Explain the Summing Amplifier developed by OP-AMP. (5)

8. Justify the principle of operation for the junction field effect transistor (JFET). (5)

9. Describe the I-V characteristic of MOSFET. (5)

10. Describe the various methods used for transistor biasing. Explain one method and (5)
    state its advantages and disadvantages.

11. Write about the drain characteristics of JFET. (5)

12. An inverting amplifier requires a voltage gain of -20 and an input impedance of 10 kΩ. (5)
    Prepare a suitable circuit diagram for the amplifier and justify the suitable values for the
    resistors.

OR

In a common-base connection, the current amplification factor is 0.9. If the emitter current (5)
is 1 mA, justify the value of the base current.

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