BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – B.Tech.(RA)-2022/B.Tech.(RA)-2023
Course Name – Electronic Devices and Circuits
Course Code - PCC-ECR301
(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) For a base current of 10 μA, calculate the value of collector current in common emitter if βdc = 100

a) 10 μA
b) 100 μA
c) 1 mA
d) 10 mA

(ii) <table border="1" cellspacing="0" cellpadding="0" width="623"> <tbody> <tr> <td width="574" valign="top"> Which one of the following is correct? </td> </tr> </tbody> </table>

a) $h_{fe}= \alpha$
b) $h_{fe}= \beta$
c) $h_{fe}=- \alpha$
d) $h_{fe}= -\beta$

(iii) Chose the correct statement: The cut-off point on the dc load line is

a) $V_{CE}=V_{CC}$, $I_C = 0$
b) $V_{BE}= V_{CC}$, $I_C=0$
c) $V_{CE}=0$, $I_C= 0$
d) $V_{BE}=0$, $I_B=0$

(iv) Choose, With zero volt on both inputs, an ideal op-amp should have an output voltage equal to

a) Positive supply voltage
b) Negative supply voltage
c) Zero
d) CMRR

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

a) A_d/A_c
b) $(A_d- A_c)/ A_d$
c) $2 \log_{10} A_d/ A_c$
d) $2 \log_e A_d/ A_c$

(vi) If the differential voltage gain and the common mode voltage gain of a differential amplifier are 48dB and 2 dB respectively, estimate the common mode rejection ratio

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

(vii) Identify, To test in a JFET, drain current is maximum when V_{GS} is

a) Zero
b) Negative
c) Positive
d) Equal to V_P

(viii) Select, The voltage gain of an ideal voltage follower is

a) 1
b) <1
c) 0
d) infinity

(ix) The voltage follower is commonly used as

a) Switch
b) Isolator
c) Regulator
d) None of these

(x) A JFET has the following parameters: IDSS = 32 mA ; VGS (off) = – 8V ; VGS = – 4.5 V. Find the value of drain current.

a) 6 mA
b) 6.12 mA
c) 6.21 mA
d) None of these

(xi) Identify, Inverting op-amp is

a) Voltage shunt feedback
b) Voltage series feedback
c) Current series feedback.
d) Current shunt feedback

(xii) Choose the correct option: Instrumentation amplifiers are used primarily in

a) High noise environment
b) Medical equipment
c) Test instruments
d) Filter circuits.

(xiii) When a JFET operates above pinch-off voltage,

a) Drain current remains constant
b) Drain current increases rapidly
c) Drain current decreases gradually
d) Depletion region becomes zero

(xiv) Which of the following are the non-linear applications of OP-AMP?

a) Current-to-voltage converter
b) Comparator
c) Peak detector
d) Limiter

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

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

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Discuss, why does CE configuration provide large current amplification. (3)

3. Explain the design of first order high pass filter. (3)

4. Write, why BJT is called current controlled device? (3)

5. Establish the major difference between a bipolar & unipolar device? (3)

6. Compare RC oscillators with LC oscillators. (3)

OR

Explain barkhausen criteria as applicable to oscillator circuits. (3)

Group-C
(Long Answer Type Questions) 5 x 6=30

7. Write the characteristics of CE configuration. (5)

8. Explain the input and output characteristics of a transistor in CB configuration. (5)

9. Express the relationship between α, β and γ of a transistor. (5)

10. State the advantage and disadvantage of negative feedback amplifier. (5)

11. Explain the operation of op-amp comparator with waveforms. (5)

12. Draw & explain RC phase shift oscillator. (5)

OR

Explain the working of collpitts oscillator. (5)

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