



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2023**

Semester : Semester III - 2021

Course Code : EEE2009

Course Name : Sem III - EEE2009 - Analog Electronics Circuits

Program : B.Tech. Electrical and Electronics Engineering

Date : 11-JAN-2023

Time : 1.00PM - 4.00PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.

PART A

ANSWER ALL THE TEN QUESTIONS

10 X 2 = 20M

1. The heavily doped region of the transistor is-----?
 a) Emitter (CO1) [Knowledge]
 b) Collector
 c) Both Emitter and Collector
 d) Only Collector
2. At cut-off, the JFET channel is
 a) at its widest point (CO2) [Knowledge]
 b) completely closed by the depletion region
 c) extremely narrow
 d) reverse biased
3. If the reverse bias on the gate of a JFET is increased, then width of the conducting channel
 a) is decreased (CO3) [Knowledge]
 b) is increased
 c) remains the same
 d) none of the above
4. An oscillator converts
 a) ac power into d.c. power (CO4) [Knowledge]
 b) dc. power into a.c. power
 c) mechanical power into a.c. power
 d) none of the above
5. In an LC oscillator, the frequency of the oscillator is L or C.
 a) Proportional to square of (CO4) [Knowledge]
 b) Directly proportional to
 c) Independent of the values of
 d) Inversely proportional to square root of

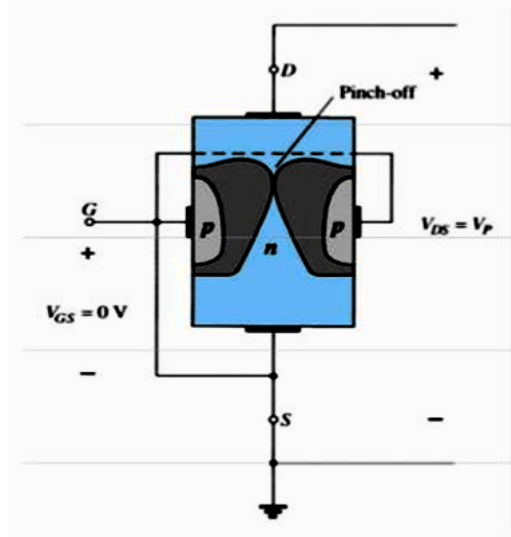
6. A JFET is also called transistor (CO3) [Knowledge]
- unipolar
 - bipolar
 - unijunction
 - none of the above
7. In a JFET, when drain voltage is equal to pinch-off voltage, the depletion layers (CO2) [Knowledge]
- almost touch each other
 - have large gap
 - have moderate gap
 - none of the above
8. Clippers are basically classified depending on _____ orientation within the circuit. (CO1) [Knowledge]
- Resistor
 - Diode
 - Capacitor
 - All of the above
9. For an oscillator to properly start, the gain around the feedback loop must initially be (CO2) [Knowledge]
- 1
 - Greater than 1
 - Less than 1
 - Equal to attenuation of feedback circuit
10. In a p-channel JFET, the charge carriers are (CO3) [Knowledge]
- electrons
 - holes
 - both electrons and holes
 - none of the above

PART B

ANSWER ALL THE FOUR QUESTIONS

4 X 10 = 40M

11. Identify the operating characteristics of JFET shown below in the figure. Also, draw the drain to source voltage (V_{DS}) vs drain current (I_D) curve for the JFET characteristics.

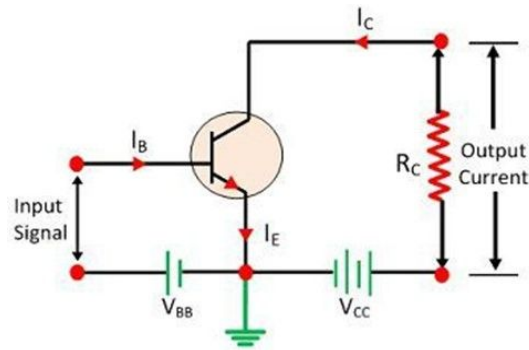


(CO3) [Comprehension]

12. The RC phase shift oscillator produces a phase shift of 180 degrees between the output and input signal. In the phase-shift oscillator, at least three RC sections are needed to give the required 180-degree phase shift for regenerative feedback. How is phase angle determined in the RC phase shift oscillator and how can we get a maximum phase angle of 90 degrees in the RC phase shift oscillator? Also draw the circuit diagram of phase shift oscillator.

(CO4) [Comprehension]

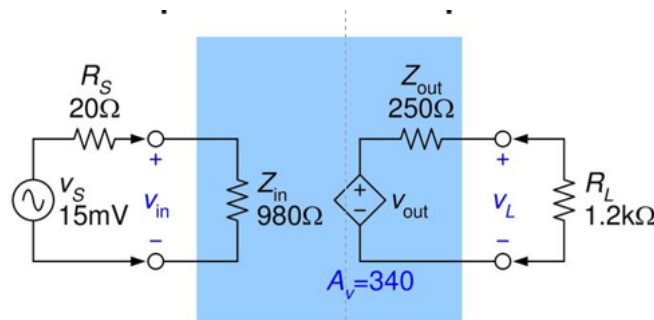
13. Draw the collector current (I_C) vs collector to emitter voltage (V_{CE}) characteristic curve for the below circuit. Also, point out the saturation, cut-off, active and breakdown region in the characteristic curve.



(CO1) [Comprehension]

NPN Transistor

14. The amplifier characteristics constitute high input impedance and low output impedance. Mr. Nagesh constructed the below circuit and he claimed that it perfectly worked as an amplifier. Is the below circuit carries the features of an amplifier? If yes then prove it by finding its input and output impedance.



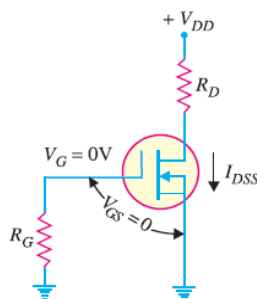
(CO2) [Comprehension]

PART C

ANSWER ALL THE TWO QUESTIONS

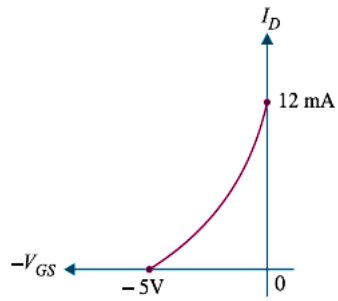
2 X 20 = 40M

15. a) For a certain D-MOSFET, $I_{DSS} = 10 \text{ mA}$ and $V_{GS}(\text{off}) = -8 \text{ V}$.
 (i) Is this an n-channel or a p-channel ?
 (ii) Calculate I_D at $V_{GS} = -3 \text{ V}$.
 (iii) Calculate I_D at $V_{GS} = +3 \text{ V}$.
- b) Determine the drain-to-source voltage (V_{DS}) in the circuit shown in Fig. 17 if $V_{DD} = +18 \text{ V}$ and $R_D = 620 \Omega$. The MOSFET data sheet gives $V_{GS}(\text{off}) = -8 \text{ V}$ and $I_{DSS} = 12 \text{ mA}$.



(CO3) [Application]

16. a) The figure below shows the transfer characteristic curve of a JFET. Write the equation for drain current.



- b) A JFET has a drain current of 5 mA. If $I_{DSS} = 10$ mA and $V_{GS}(\text{off}) = -6$ V, find the value of (i) V_{GS} and (ii) V_P .

(CO4) [Application]
