



BRAINWARE UNIVERSITY

Term End Examination 2023 Programme – B.Tech.(ECE)-2019/B.Tech.(ECE)-2020

Course Name – Electronic Devices
Course Code - PCC-EC301

(Semester III)

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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

- Choose the correct alternative from the following :
- (i) A transistor works in three regions:) Cut-off, ii) active, and iii) saturation. Which is used as switch in digital logic gates, the regions it works in are:

a) i) and ii) only

b) ii) and iii) only

c) i) and iii) only

- d) i), ii) and iii)
- (ii) For a p-n-p transistor in CE mode, β =100, then the value of α of the transistor is

a) 0.99

b) 0.099

c) 9.9

d) 99

- (iii) In ICEO, what does the subscript 'CEO' mean?
 - a) Collector to base emitter open
- b) Emitter to base collector open
- c) Collector to emitter base open
- d) Emitter to collector base open
- (iv) Consider the following statements related to CMOS (Complementary metal oxide semiconductor) inverter: 1. It combines an n-channel and a p-channel MOS transistor. 2. For binary 1 input, both transistors are OFF. 3. For binary 0 input, both transistors are ON.
 - 4. Whatever is the state of input, one transistor is ON while the other is OFF. Which of the statements given above are correct?

a) 1,2,3 and 4

b) 1 and 4

c) 1,2 and 3

- d) 3 and 4
- (v) A diode whose terminal characteristics are related as $I = Is e^{V/V_T}(Is is the reverse saturation current, and <math>V_T$ is the thermal voltage(=25mV)) is biased at i = 2mA. Its dynamic resistance is

a) 25 ohm

b) 12.5 ohm

c) 50 ohm

- d) 100 ohm
- (vi) 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

(vii)	The emitter current consists of			
(viii)	a) Carriers passing from collector to emitterc) Carriers passing from emitter to baseThe junction capacitance of a p-n diode is used in	b) Carriers passing from base to collectord) None of these	or	
	a) Varactor diode	b) Photo diode d) Tunnel diode		
		b) cm/V-s d) cm ² /V		
رز <mark>(xi)</mark>	 c) Generate hole and electrons The reverse saturation current of a PN-junction of 	b) Generate holes d) All of these liode is		
\$1001	a) Increased with temperature	b) Decreased with temperatured) Independent of temperature		
		b) Germanium and phosphorus d) Silicon and phosphorus rain current ID becomes		
			in	
		b) 1.98μA and 2mA d) 2mA and 1.98μA		
		b) VCB is +ve and VBE is -ve d) Both VCB and VBE are -ve		
	Group	о-В		
(Short Answer Type Questions) 3 :				
2. Draw the circuit symbol of MOSFET. Sketch the structure of an n channel depletion type MOSFET. Draw the typical drain characteristics of it in both enhancement and depletion modes.			(3)	
3. Estimate the donor concentration in N-type Germanium semiconductor having conductivit 2.016(?m)-1 and mobility 0.24 m2/VS			(3)	
4. In a common emitter n-p-n transistor, VBB=5V, RB=100K?, RC=1K?, VCC=10V,VBE=0.7V, ICO=0 and ?=100. Find IB and IC.			(3)	
5. Sketch the depletion region before and after pinch-off.6. Compare between a FET and a BJT.			(3) (3)	
A E	OR IJT is a current controlled device while a FET is a	voltage controlled device. Explain.	(3)	
Group-C				
	(Long Answer Typ	pe Questions)	5 x 6=30	
7. D	raw circuit diagrams for different modes of o	peration relating to both n-p-n and p	- (5)	

 Draw circuit diagrams for different modes of operation relating to both n-p-n and p- (5) n-p transistor.

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OR With a neat sketch, describe the construction of an n-channel JFET. Explain its orinciple of operation.	(5)		
Explain the nature of the typical common-source drain characteristics of a JFET. What s its transfer characteristics?	.(5) ***;		
Draw I-V characteristics of p-n junction diode. Define cut in voltage.	(5) _{,,}		
What do you mean by effective mass of a current carrier in a semiconductor? Distinguish between drift current and diffusion current	(5)		
cransfer characteristic, show how gm varies with VGS and IDS. Craw the circuit symbol of MOSEET Sketch the atmost of the street	(5) (5)		
	raw the circuit symbol of MOSFET. Sketch the structure of an n channel depletion to the MOSFET. Draw the typical drain characteristics of it in both enhancement and epletion modes. That do you mean by effective mass of a current carrier in a semiconductor? istinguish between drift current and diffusion current Traw I-V characteristics of p-n junction diode. Define cut in voltage. Explain the nature of the typical common-source drain characteristics of a JFET. What its transfer characteristics?		