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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech.

SEM: III - THEORY EXAMINATION (2021 - 2022) (ONLINE)

Subject: Electronic Devices

Time: 02:00 Hours Max. Marks: 100

General Instructions:

1. *All questions are compulsory. It comprises of two Sections A and B.*

- *Section A - Question No- 1 has 35 objective type questions carrying 2 marks each.*
- *Section B - Question No- 2 has 12 subjective type questions carrying 3 marks each. You have to attempt any 10 out of 12 question.*
- *No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.*

SECTION A 35 x 2 = 70

1. Attempt ALL parts:-

1.1.a In a PN junction with no external voltage, the electric field between acceptor and donor ion is called a 1

(a) Peak
(b) Barrier
(c) Threshold
(d) Path

1.1.b The capacitance of a reverse-biased PN junction 1

(a) Increases as reverse bias is increased
(b) Decreases as reverse bias is increased
(c) Increases as reverse bias is decreased
(d) Is significantly low

1.1.c When PN junction is in forward bias, by increasing the battery voltage (CO1) 1

(a) Circuit resistance increases
(b) Current through P_N junction increases
(c) Current through P_N junction decreases
(d) None of the above

1.1.d A zener diode can be tested with an ohmmeter. 1

(a) TRUE
(b) FALSE

1.1.e Schottky diodes are used primarily in high-frequency and fast-switching applications. 1

(a) TRUE
(b) FALSE

1.1.f With varactor diodes, junction capacitance varies with the amount of forward-bias voltage. 1

(a) TRUE
(b) FALSE

1.1.g Trivalent doping is prefer in P-type semiconductor 1

(a) TRUE
(b) FALSE

1.2.a For normal operation of a pnp BJT, the base must be _____ with respect to the emitter 1

and _____ with respect to the collector.

(a) positive, negative
(b) positive, positive
(c) negative, positive
(d) negative, negative

1.2.b What is the ratio of IC to IB? 1

(a) Beta
(b) hFE
(c) alfa
(d) either beta or hFE, but not alfa

1.2.c When a transistor is used as a switch, it is stable in which two distinct regions? (CO2) 1

(a) saturation and active
(b) active and cutoff
(c) saturation and cutoff
(d) none of the above

1.2.d For a silicon transistor, when a base-emitter junction is forward-biased, it has a nominal voltage drop of (CO2) 1

(a) 0.7 V.
(b) 0.3 V.
(c) 0.2 V.
(d) VCC.

1.2.e Base biasing is common in relay driver circuits. 1

(a) TRUE
(b) FALSE

1.2.f A transistor is operating in a linear fashion at saturation. 1

(a) TRUE
(b) FALSE

1.2.g Collector-feedback bias provides very poor stability with negative feedback from collector to base. 1

(a) TRUE
(b) FALSE

1.3.a For a JFET, the value of VDS at which ID becomes essentially constant is the 1

(a) pinch-off voltage.
(b) cutoff voltage.
(c) breakdown voltage.
(d) ohmic voltage.

1.3.b What is the effect of MOSFET biasing in the saturation region especially while representing the internal resistances and capacitances in n-channel E-MOSFET configuration? 1

(a) Channel gets pinched off at the drain by increasing the value of Cgd
(b) Channel gets pinched off at the source by increasing the value of Cgd
(c) Channel gets pinched off at the drain by decreasing the value of Cgd upto zero
(d) Channel gets pinched off at the source by decreasing the value of Cgd

1.3.c A self-biased n-channel JFET has a VD = 6 V. VGS = –3 V. Find the value of VDS. 1

(a) –3 V
(b) –6 V
(c) 3 V
(d) 6 V

1.3.d What type(s) of gate-to-source voltage(s) can a depletion MOSFET (D-MOSFET) operate with? (CO3) 1

(a) zero
(b) positive
(c) negative
(d) any of the above

1.3.e On the drain characteristic curve of a JFET for VGS = 0, the pinch-off voltage is 1

(a) below the ohmic area.
(b) between the ohmic area and the constant current area.
(c) between the constant current area and the breakdown region.
(d) above the breakdown region.

1.3.f One advantage of a JFET over the BJT is its high input resistance. 1

(a) TRUE
(b) FALSE

1.3.g An E-MOSFET can be operated with either positive or negative values of VGS. 1

(a) TRUE
(b) FALSE

1.4.a Which of the following is (are) true of a self-bias configuration compared to a fixed-bias configuration? 1

(a) One of the dc supplies is eliminated.
(b) A resistor RS is added.
(c) Vgs is a function of the output current ID.
(d) All of the above

1.4.b Which of the following represents the voltage level of VGS in a self-bias configuration? 1

(a) Vg
(b) Vgs(off)
(c) Vs
(d) Vp

1.4.c Which of the following is a false statement regarding the dc load line when comparing self-bias and voltage-divider configurations? 1

(a) Both are linear lines.
(b) Both cross the origin.
(c) Both intersect the transfer characteristics.
(d) Both are obtained by writing Kirchhoff's voltage law (KVL) at the input side loop.

1.4.d Which of the following describe(s) the difference(s) between JFETs and depletion-type MOSFETs? (CO4) 1

(a) Vgs can be positive or negative for the depletion-type.
(b) Id can exceed Idss for the depletion-type.
(c) The depletion-type can operate in the enhancement mode.
(d) All of the above

1.4.e Bypassing a source resistor reduces the voltage gain. 1

(a) TRUE
(b) FALSE

1.4.f The common-drain amplifier is also called a source-follower. 1

(a) TRUE
(b) FALSE

1.4.g The common-drain configuration has extremely high input resistance. (CO4) 1

(a) TRUE
(b) FALSE

1.5.a Conformal coating is done in PCB assemblies to 1

(a) Improve strength
(b) Protect electronics form Moisture and contamination
(c) Increase withstand voltage
(d) Improve aesthetics

1.5.b a typical solvent used for cleaning of Electronic assemblies 1

(a) Iso Propyl Alcohol
(b) Petrol
(c) Carbonated water
(d) Liquid nitrogen

1.5.c In PCB, the conformal coating is done 1

(a) To protect it from moisture and chemical pollutants
(b) to provide mechanical strength
(c) To produce a better looking product
(d) To protect against increasing voltage

1.5.d Surface mount technic has minimal PCB footprint 1

(a) TRUE
(b) FALSE

1.5.e Through-hole technic has larger PCB footprint (CO5) 1

(a) TRUE
(b) FALSE

1.5.f Rework is relatively simple in through hole 1

(a) TRUE
(b) FALSE

1.5.g Wrap and twist is more critical for assembly in surface mount technology 1

(a) TRUE
(b) FALSE

SECTION B 10 X 3 = 30

2. Answer any TEN of the following:-

2.1.a What is the difference between the band structure of an insulator and of a semiconductor? (CO1) 2

2.1.b Define mobility. Give its dimensions. 2

2.2.a Define ICBO and ICEO. How are they different? How are they related? Are they typically close in magnitude? (CO2) 2

2.2.b From memory only, sketch the common-emitter configuration (for npn and pnp) and insert the proper biasing arrangement with the resulting current directions for IB, IC, and IE. 2

2.2.c What is Early effect? 2

2.3.a Define the pinch-off voltage of a JFET. (CO3) 2

2.3.b Why does the thermal runaway phenomenon never happen in a JFET? 2

2.3.c What is the difference between Depletion and enhancement mode MOSFET? 2

2.4.a What is small signal analysis? (C04) 2

2.4.b What are the advantages of CE amplifier? 2

2.5.a What is Surface mount technology? 2

2.5.b What is clean-room technology? 2