Q.6   i.   Draw the block diagram of feedback scheme. Why negative feedback is more advantageous than positive feedback.   **4**

     ii.   Explain various feedback topologies? Give expressions for input & output resistances.   **6**

OR   iii.   What is the criterion for oscillation? Explain the working of wein bridge oscillator & deduce the expression for oscillator frequency.   **6**

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Enrollment No......................................

Faculty of Engineering

End Sem (Odd) Examination Dec-2017

EC3CO03 / EI3CO03 Electronic Devices and Circuits

Programme: B.Tech.   Branch/Specialisation: EC/EI

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1   i.   At very high temperature the extrinsic semiconductor become intrinsic because   **1**
(a) Drive in diffusion of dopants & carrier
(b) Band to band transition dominants over impurity ionization
(c) Impurity ionization dominants over band to band transition
(d) Band to band transition is balanced by impurity ionization

     ii.   In a Zener diode   **1**
(a) The forward current is very high
(b) Sharp breakdown occurs at a certain reverse voltage
(c) The ratio of V-I can be negative
(d) There are two p-n junctions

     iii.   In a bipolar transistor which current is largest   **1**
(a) I_C (b) I_E (c) I_B (d) None of these

     iv.   The most commonly used transistor configuration is   **1**
(a) Common emitter   (b) Common base
(c) Common collector   (d) None of these

     v.   A JFET is a_____ driven device.   **1**
(a) Voltage   (b) Current
(c) Both (a) & (b)   (d) None of these

     vi.   A MOSFET differs from a JFET mainly because   **1**
(a) Of power rating   (b) The MOSFET has two stages
(c) The JFET has p-n junction (d) None of the above

vii. The main features of a large signal amplifier circuit is   **1**
(a) Power efficiency
(b) Max power limitation
(c) Impedance matching to the output devices
(d) All of these

viii. A two transistor class B power amplifier is commonly   **1**
called_____amplifier.
(a) Dual   (b) Push-pull
(c) Symmetrical   (d) Differential

ix. The value of negative feedback fraction is always   **1**
(a) Less than 1   (b) More than 1
(c) Equal to one   (d) One

x. An oscillator employs _____ feedback   **1**
(a) Positive
(b) Negative
(c) Neither negative nor positive
(d) None of these

Q.2
i. What is Hall effect?   **2**
ii. Explain V-I characteristics of Zener diode with both types of breakdowns.   **3**
iii. Explain PN junction diode with respect to following points-   **5**
(a) Application   (b) Effect of temperature-change
OR iv. Explain working of any one full wave rectifier. Give expressions for: **5**
(a) Rectifier efficiency   (b) Ripple factor

Q.3
i. Give relation between α, β & Υ of BJT.   **2**
ii. Why is biasing required in BJT? Which biasing circuit is mostly used & why?   **3**
iii. Explain the H-parameter model of transistor & Derive the expression of current gain & voltage gain.   **5**

OR iv For the silicon transistor Find the value of $I_C, I_B, I_E, V_B, V_C, V_E, V_{CE}, V_{BC}.$ The figure is shown below.   **5**
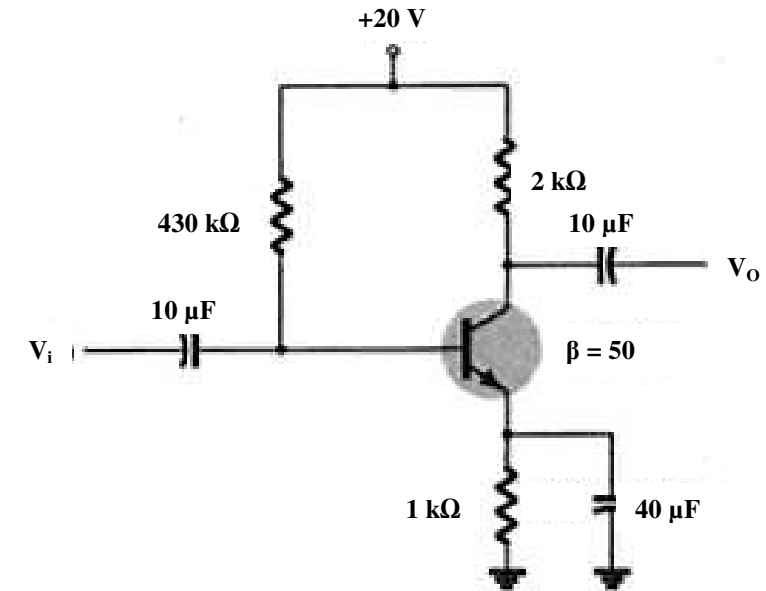
Q.4
i. Explain construction & working of N-channel JFET. When is pinch off condition reached?   **4**
ii. Draw and explain the drain & transfer characteristics of JFET with different regions of operations.   **6**
OR iii. Draw a neat labelled schematic diagram of depletion type MOSFET & Explain its working.   **6**

Q.5
i. Why bootstrapping is required in a BJT based amplifier circuit? Explain with neat labelled diagram.   **4**
ii. Describe the working of a class-B amplifier & calculate its power & efficiency.   **6**
OR iii. What are push pull amplifier? A class B push pull power amplifier is supplied with V_{cc} =50V. The signal swings the collector voltage down V_{min} =5V. The total power dissipation in both transistors is 40 W. Find the total power & conversion efficiency.   **6**

EC3CO03 / EI3CO03 Electronic Devices and Circuits

Marking Scheme

Q.1 i.   (b) Band to band transition dominants over impurity ionization   **1**
     ii.   (b) Sharp breakdown occurs at a certain reverse voltage   **1**
     iii. (b) I_E **1**
     iv.   (a) Common emitter   **1**
     v.   (a) Voltage   **1**
     vi.   (c) The JFET has p-n junction   **1**
     vii. (d) All of these   **1**
     viii. (b) Push-pull   **1**
     ix.   (a) Less than 1   **1**
     x.   (a) Positive   **1**

Q.2 i.   1 mark for diagram   **2**
           1 mark for explanation
     ii.   1 mark for V-I characteristics diagram   **3**
           2 marks for breakdowns.
     iii. 2.5 marks for Application   **5**
           2.5 marks for effect of temperature-change
OR   iv.   2 marks for working   **5**
           1 mark for rectifier efficiency
           1 marks for ripple factor
           1 mark for diagram

Q.3 i.   2 marks for relation between α, β & ϒ of BJT.   **2**
     ii.   1 marks for reason for biasing   **3**
           2 marks for type mostly used.
     iii. 2 marks for H-parameter model diagram & equation,   **5**
           1.5 marks for current gain
           1.5 marks for voltage gain
OR   iv   2 marks for I_C,I_B,I_E , 2 marks for V_B,V_C,V_E, 1 mark for V_{CE},V_{BC} **5**
           Ans- $I_B = 40.1$ μA $I_C = 2.01$ mA $I_E = 2.05$ mA
                $V_B = 2.71$V $V_C = 15.98$ V $V_E = 2.01$ V
                $V_{CE} = 13.97$ V $V_{BC} = -13.27$ V

Q.4 i.   1 mark for construction   **4**
           2 marks for working of N-channel JFET
           1 mark for condition asked
     ii.   2 marks for drain characteristics of JFET   **6**
           1 mark for transfer characteristics of JFET
           3 marks for region explanation
OR   iii. 2 marks for diagram of depletion type MOSFET   **6**
           4 marks for its working

Q.5 i.   1.5 marks for diagram   **4**
           2.5 marks for explanation.
     ii.   2 marks for working   **6**
           2 marks for power calculation
           2 marks for efficiency calculation.
OR   iii. 2 marks for push pull amplifier   **6**
           2 marks for total power
           2 marks for efficiency
           P_{in}(dc)=136.45 W P_{out}(ac)=99.65 W   η=73.03%

Q.6 i.   1 marks for diagram   **4**
           3 marks for advantages.
     ii.   3 marks for various topologoies   **6**
           3 marks for expression.
OR   iii. 1 mark for criterion   **6**
           3 marks for wein bridge
           2 marks for oscillator frequency.