

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**BE - SEMESTER-III (New) EXAMINATION – WINTER 2015**

**Subject Code: 2131006**

**Date: 21/12/2015**

**Subject Name: Electronic Devices and Circuits.**

**Time: 2:30pm to 5:00pm**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

|            |                                                                                                                                                      | <b>MARKS</b> |
|------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Q.1</b> | <b>Short Questions</b>                                                                                                                               | <b>14</b>    |
|            | 1 How much forward diode voltage is there with the ideal diode Approximation?                                                                        |              |
|            | 2 Which device is work as voltage controlled?                                                                                                        |              |
|            | 3 What is the maximum efficiency of a class B push-pull amplifier?                                                                                   |              |
|            | 4 What is the maximum peak to peak unclipped output if an emitter follower has $V_{CEQ}=6V$ , $I_{CQ}=200mA$ and $r_e=10\Omega$ ?                    |              |
|            | 5 What is the total ac emitter resistance of an emitter follower?                                                                                    |              |
|            | 6 Write down the use of a common base amplifier.                                                                                                     |              |
|            | 7 Which feedback is used by the swamped amplifier?                                                                                                   |              |
|            | 8 What kind of the effect on the output voltage if bypass capacitor is not present?                                                                  |              |
|            | 9 What is the value of the ac resistance of the emitter diode if the ac voltage across the emitter diode is 1mV and emitter current is 100 $\mu A$ ? |              |
|            | 10 Which circuit is removing positive or negative parts of a wave form?                                                                              |              |
|            | 11 What is the value of base current if the current gain is 100 and collector current is 10mA?                                                       |              |
|            | 12 Which diode has a negative resistance region?                                                                                                     |              |
|            | 13 Which diode has a forward voltage drop of approximately 0.25V?                                                                                    |              |
|            | 14 If $N_1/N_2 = 4$ and the primary voltage is 120V, what is the secondary voltage?                                                                  |              |
| <b>Q.2</b> | (a) What is semiconductor? Define n-type semiconductor.                                                                                              | <b>03</b>    |
|            | (b) Give minimum four comparison of LED and photo diode.                                                                                             | <b>04</b>    |
|            | (c) Explain bridge rectifier in detail.                                                                                                              | <b>07</b>    |
|            | <b>OR</b>                                                                                                                                            |              |
|            | (c) Explain parallel clipper circuit in detail.                                                                                                      | <b>07</b>    |
| <b>Q.3</b> | (a) If the base current of transistor is 30 $\mu A$ when the emitter current is 7.2 mA, what are the values of $\beta$ and $\alpha$ ?                | <b>03</b>    |
|            | (b) Write the advantages of transistor, and explain why it is called "Bipolar Transistor"?                                                           | <b>04</b>    |
|            | (c) Explain biased and unbiased NPN transistor in detail.                                                                                            | <b>07</b>    |
|            | <b>OR</b>                                                                                                                                            |              |
| <b>Q.3</b> | (a) Explain applications of optocoupler.                                                                                                             | <b>03</b>    |
|            | (b) Explain advantages and disadvantages of photo transistor.                                                                                        | <b>04</b>    |
|            | (c) Explain Voltage Divider Bias biasing in detail with its circuit                                                                                  | <b>07</b>    |

|            |                                                                                                                                                                           |           |
|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|            | operation and required equations .                                                                                                                                        |           |
| <b>Q.4</b> | <b>(a)</b> Draw T model and $\pi$ model circuit for CE amplifier.                                                                                                         | <b>03</b> |
|            | <b>(b)</b> State and Explain miller's theorem.                                                                                                                            | <b>04</b> |
|            | <b>(c)</b> Explain Darlington pair in detail, also derive its current gain                                                                                                | <b>07</b> |
|            | <b>OR</b>                                                                                                                                                                 |           |
| <b>Q.4</b> | <b>(a)</b> A JFET has a pinch off voltage of -4 volts and the saturation current of 9 mA. calculate the drain current if $V_{GS}=-2$ volts.                               | <b>03</b> |
|            | <b>(b)</b> State the advantages and disadvantages of FET over BJT.                                                                                                        | <b>04</b> |
|            | <b>(c)</b> Explain construction, operation and characteristic of n-channel Depletion MOSFET in detail.                                                                    | <b>07</b> |
| <b>Q.5</b> | <b>(a)</b> What is the difference between voltage amplifier and power amplifier?                                                                                          | <b>03</b> |
|            | <b>(b)</b> Compare different types of power amplifier based on conduction angle, position of Q-point, efficiency and distortion.                                          | <b>04</b> |
|            | <b>(c)</b> Explain operation of class B-push pull amplifier with the help of circuit and wave form.                                                                       | <b>07</b> |
|            | <b>OR</b>                                                                                                                                                                 |           |
| <b>Q.5</b> | <b>(a)</b> In a negative feedback amplifier $A=100$ , $\beta=0.02$ and input voltage is 40 mV. Determine voltage gain with feedback, output voltage and feedback voltsge. | <b>03</b> |
|            | <b>(b)</b> Obtain the expression for transistor gain for negative feedback.                                                                                               | <b>04</b> |
|            | <b>(c)</b> Derive the expression of the input resistance with feedback for current series feedback amplifier.                                                             | <b>07</b> |

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