Code No: NR221401 **NR**

II B.Tech II Semester Supplementary Examinations, November/December 2005
ELECTRONIC DEVICES AND CIRCUITS
(Mechatronics)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Mention the expression for V_o (contact potential or barrier voltage) in terms of concentration of dopant atoms for a PN junction diode and discuss its role in the Semiconductor device working under forward and reverse bias conditions.
   (b) Draw the Energy Band diagram to explain Zener break-down phenomenon
   (c) Discuss the various factors that contribute to the dependence of the semiconductor diode current on temperature. [6+6+4]

2. (a) Discuss how Full wave rectification differs from Half Wave rectification
   (b) Explain how the Transformer turns ratio affects rectified output voltage.
   (c) Compare the performance features of center tapped full wave rectifier and a Bridge rectifier circuit using the same type of transformers. [6+4+6]

3. (a) Draw diagrams showing the basic structure of PNP Transistor and its circuit symbol.
   (b) Draw a circuit for CE configuration using PNP transistor.
   (c) Draw the input and output characteristics of a Common Emitter Transistor and discuss the method of obtaining the characteristics
   (d) Explain the operation of a PNP Bipolar Junction Transistor in CE configuration. [3+3+4+6]

4. (a) Draw the selfbias circuit using BJT. Mention the DC load line equation and its significance in the design of Transistor amplifier circuits.
   (b) In a Transistor fixed bias circuit, V_{CC} =12.7 Volts, V_{BE} = 0.7 Volts, R_B = 2 MΩ .,R_C=10KΩ and Transistor 'β' = 100. Draw the circuit with the data and determine the values of Base current I_B, Collector current I_C and V_{CE}. [8+8]

5. (a) Discuss the classification of amplifiers based on frequency of operation, mode of operation and types of coupling used.
   (b) Draw typical frequency response characteristic of amplifiers and discuss the circuit elements that cause for reduction in amplifier gain at low frequency region and high frequency region.
   (c) Define f_T and gain-bandwidth product of amplifiers. [6+6+4]

6. (a) Draw the three types of JFET biasing circuits and compare them with reference to the stability of the amplifier circuits

(b) Design a fixed bias circuit using JFET for the following specifications: V_{DD}= 12V; V_{DS}= 5V; I_{DSS}= 10mA; V_P= −8V; V_{GS}= −2V. [10+6]

7. (a) Mention the two types of feedbacks in electronic amplifiers. Explain the basic concepts of feedbacks using block diagrams and derive the expressions for overall gains

(b) Draw the circuit diagram of a negative voltage feedback amplifier and explain its working with necessary details.

(c) An amplifier with voltage gain of 60 decibels uses 0.05 of its output voltage in negative feedback. Calculate the gain of the feedback amplifier. [6+6+4]

8. (a) Draw the circuit of R-C phase shift oscillator circuit using JFET as the active device and discuss the nature of feed back used in the feedback path.

(b) In the R-C phase shift oscillator circuit, discuss the passive of part of the circuit that is responsible to get the 180^0 phase shift.

(c) Calculate the value of 'C' in the frequency-determining network of a FET RC phase shift oscillator circuit having R = 2.5 KΩ ; assuming frequency of oscillation f = 1.625 KHZ.

(d) Repeat (c) if it is a BJT RC phase shift oscillator with $R_C = 4k\Omega$ [5+5+3+3]

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