**R09**

**Code No: 09A30203**

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD**
**B. Tech. II Year I Semester Examinations, May/June-2013**
**Electronic Devices and Circuits**
**(Common to EEE, ECE, CSE, EIE, BME, IT, MCT, ETM, ECOMPE, ICE)**

**Time: 3 hours** **Max. Marks: 75**

**Answer any five questions**
**All questions carry equal marks**

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1.a) Draw the V-I characteristics of a diode with zero cut-in voltage and equivalent resistance of 100 Ω. Draw the load line if $R_L$ is also 100 Ω.
b) Draw the equivalent circuit of a diode circuit when a DC voltage to forward bias the diode along with an ac signal is applied.
c) Differentiate between normal PN junction diode and a Zener diode. [15]

2.a) Derive expressions for ripple factor, regulation and rectification efficiency of a half wave rectifier.
b) Design an LC filter for a Full wave rectifier to give 9V output as DC voltage at 100 mA current. Assume ripple factor to be 2%.
c) Compare the filtering characteristics of capacitance type, choke input type and Π-type filters. [15]

3.a) Based on the currents flowing through a BJT illustrate the amplification process.
b) Sketch the input and output characteristics of a BJT in CE configuration and discuss how β of the transistor can be determined form the characteristics.
c) Compare CB, CC, and CE configurations. [15]

4.a) What is the need of biasing a BJT for amplifier application? List the deficiencies of fixed bias and emitter feedback bias methods and explain how they are overcome in voltage divider bias method.
b) Define stability factors for a BJT with any biasing method. Suggest a method to compensate for temperature variation effects on operating point of a BJT circuit.
c) What is thermal runaway? Discuss the causes for it. [15]

5.a) Discuss the effect of $V_{GS}$ on drain current of a JFET based on its structure.
b) Define: Pinch-off voltage, mutual conductance ($g_m$), dynamic drain resistance ($r_d$) and amplification factor (μ) for a JFET and establish a relation between them.
c) Explain the operation of a MOSFET in enhancement and depletion modes. [15]

6.a) What is the difference between approximate and accurate h-parameter models of a BJT in CE configuration? Discuss the conditions applicable for each model.
b) Draw the h-parameter equivalent circuit of a generalized BJT amplifier and derive expressions for $A_v$, $A_i$, $R_i$ and $R_o$. [15]

7.a) Draw the circuit diagram, equivalent circuit of a JFET small signal amplifier in CS configuration and derive expressions for $A_v$, $A_i$, $R_i$ and $R_o$. Make applicable assumptions and comments.

b) A 12 kΩ load resistance is connected to the output of a JFET CS amplifier. If $R_G$, $R_S$ and $C_S$ are given as 1MΩ, 1 kΩ and 25 μF respectively and μ, $r_d$ of JFET are listed as 20 and 10 kΩ respectively, find the output voltage for a sinusoidal input of peak 0.1 volts at 2 kHz frequency. [15]

8.a) Which type of diode capacitance is utilized in varactor diode operation. Explain its principle of operation.

b) Name the device exhibiting negative resistance region in its V-I characteristic. With suitable diagram explain the operation of this device.

c) Discuss the constructional details of SCR and Schotky barrier diode. [15]

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