

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  $100 \Omega$ . Draw the load line if  $R_L$  is also  $100 \Omega$ .
- 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  $\Pi$ -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  $\beta$  of the transistor can be determined from 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 ( $\mu$ ) 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  $12\text{ k}\Omega$  load resistance is connected to the output of a JFET CS amplifier. If  $R_G$ ,  $R_S$  and  $C_S$  are given as  $1\text{ M}\Omega$ ,  $1\text{ k}\Omega$  and  $25\text{ }\mu\text{F}$  respectively and  $\mu$ ,  $r_d$  of JFET are listed as 20 and  $10\text{ k}\Omega$  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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