Code No: R1621041 **R16** SET - 1

II B. Tech I Semester Model Question Paper Sept- 2017
ELECTRONIC DEVICES AND CIRCUITS
(Com. To ECE, EIE, ECC)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A [7 x 2 =14]

1. a) Explain the difference between transition and diffusion capacitances of P-N diode
   b) Draw the Construction diagram and characteristics of the Photo diode
   c) Give the values of ripple factor and efficiency for full wave rectifier.
   d) What are the differences between BJT and JFET?
   e) List the advantage and disadvantages of fixed bias method
   f) Draw the small signal low frequency h-parameter model of a CB Transistor
   g) Explain briefly drain characteristics of N-channel enhancement MOSFET

PART –B

2. a) What is the Hall Effect? Derive the an Expression for Hall Coefficient? (7M)
   b) Explain the Diffusion and Drift currents for a semiconductor. (7M)

3. a) Explain the working of Tunnel diode and its V-I characteristics. And what is the sufficient condition for tunneling. (7M)
   b) Explain the construction and working of Zener diode. (7M)

4. a) Derive the expression for ripple for the circuit FWR with inductor filter. (7M)
   b) Give the list of different filters used in rectifier and their merits and demerits. (7M)

5. a) Explain the construction and working of Enhancement MOSFET. (7M)
   b) Draw the Eber-moll model of a transistor. (7M)

6. a) What is thermal runaway? Derive relevant expressions to obtain thermal stability (7M)
   b) In a silicon transistor with a fixed bias, V_{cc}= 9 V, R_c= 3 kΩ, R_B= 8kΩ, β = 50, V_{BE}= 0.7V. Find the operating point and stability factor. (7M)

7. a) Find the value of hoe in terms of CB h-parameters (7M)
   b) Define h-parameters along with its units. (7M)

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Code No: R1621041 **R16** SET - 2

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Time: 3 hours Max. Marks: 70

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2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

[7 x 2 =14]

1. a) Define continuity equation
   b) Explain the working of Schottky barrier diode with necessary sketches
   c) Define peak inverse voltage
   d) Describe the basic structure of the BJT.
   e) Define Thermal runaway.
   f) Compare different transistor amplifiers
   g) Explain how transistor works as an amplifier

PART –B

2. a) Derive expression for current density of an intrinsic semiconductor (7M)
   b) Show that the Fermi energy level lies in the centre of forbidden energy band for an intrinsic semiconductor? Derive. (7M)

3. a) Explain the construction and working of SCR (7M)
   b) Explain in detail about the current components in a p-n junction diode. (7M)

4. a) With circuit and necessary waveforms explain the operation of bridge rectifier. (7M)

   b) An ac supply of 220V is applied to a half wave rectifier circuit through a transformer with a turns ratio of 10:1. Find (i) DC output voltage (ii) PIV. Assume the diode to an ideal one. (7M)

5. a) Draw the construction diagram, operation characteristics and parameters of JFET (7M)
   b) For the NPN transistor connected in CE configuration with V_{CC}=9 V, V_{BB}=4V, I_C = 5 m A, V_{CE}=5 V, β=50 and V_{BE}=0.7 V. Find β and R_B (7M)

6. a) What is Biasing? Explain the need of it. List out different types of biasing methods. (7M)
   b) In a Self bias circuit containing R_1=50KΩ, R_2=25KΩ, R_e=1KΩ, R_C=3KΩ, β =90, V_{CC}=12V, V_{BE}=0.7V. Find the operating point, S, S', and S". (7M)

7. a) Given I_E= 2.5mA, h_{fe}= 140, h_{oe}= 20μs and h_{ob}= 0.5μs. Determine the common-emitter hybrid equivalent circuit. (7M)
   b) Give the advantages of H-parameter analysis. (7M)

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Code No: R1621041 **R16** SET - 3

II B. Tech I Semester Model Question Paper Sept- 2017
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Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

[7 x 2 =14]

1. a) Define Depletion region and explain how the p-n junction formed?
   b) List the applications of Varactor diode
   c) Derive an expression for TUF in Bridge rectifier?
   d) Explain the working principle of n-MOSFET
   e) Derive the stability factor for S and S' for fixed bias circuit
   f) Draw H-parameter model of a CE transistor.
   g) Define i) Ripple factor ii) % Regulation

PART -B

2. a) Derive expression for the continuity equation (7M)
   b) Derive an expression for conductivity in a intrinsic semiconductor in terms of electron & hole concentration (7M)

3. a) Explain the working of p-n diode in forward and reverse bias conditions. (7M)
   b) Explain the operation of varactor diode with neat diagram (7M)

4. a) Determine the rating of a transformer to deliver 125 watts of dc power to a load for the following. (i) Half wave rectifier. (ii) Full wave rectifier (iii) Bridge rectifier (7M)
   b) With a neat sketch explain the working of Half-wave rectifier. (7M)

5. a) From the transistor current components, deduce the current equation of transistor (7M)
   b) Calculate the values of I_D and gm for V_{GS} = -0.8V, if I_{DSS} and V_P are given as 12.(4M)A and -6V respectively. (7M)

6. a) With the help of neat diagram explain the voltage divider biasing method for FET (7M)
   b) What are the drawbacks transistors fixed bias circuits (7M)

7. a) Compare A_V, A_I , R_i and R_o of CE, CB and CC configurations. (7M)
   b) Give the approximate H-parameter conversion formulae for CC and CB configuration in terms of CE. (7M)

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Code No: R1621041 **R16** SET - 4

II B. Tech I Semester Model Question Paper Sept- 2017
ELECTRONIC DEVICES AND CIRCUITS
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Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

[7 x 2 =14]

1. a) Explain drift and diffusion currents in semiconductors
   b) Draw the V-I Characteristics of diode and explain
   c) Derive expression for the efficiency of a Half wave rectifier circuit
   d) If the transistor has an α of 0.98, find the value of β and if β is 200 find α
   e) Draw the self bias circuit for BJT and derive for the stability factor 'S'
   f) Draw the small signal model of FET
   g) State Hall effect and what are its applications

PART -B

2. a) Explain the semiconductors, insulators and metals classification using energy band (7M)

   b) Find the concentration of holes and electrons in a p-type germanium at 300^0K, if the conductivity is 100Ω-cm. mobility of holes in germanium μp = 1800cm^2 /Vsec (7M)

3. a) Compare and contrast Zener breakdown and Avalanche breakdown (7M)

   b) Calculate the dc and dynamic ac resistances of a Silicon diode at 300^0K with I_0=2.5 μA and at an applied voltage of 0.25 V across the diode (7M)

4. a) Explain L-section and π-section filter with diagrams (7M)
   b) Design LC filter for a Full-wave rectifier circuit to provide an output voltage of 10 V with a load current of 200 m A and the ripple is limited to 2%. (7M)

5. a) An n-channel JFET has I_{DSS} =10mA and V_P = - 2V. Determine the drain source resistance r_{DS} for (i) V_{GS} =0V. (ii) V_{GS} = - 0.5V (7M)
   b) Explain input and output characteristics of common emitter configuration. (7M)

6. a) Differentiate bias stabilization and compensation techniques (7M)
   b) Calculate the quiescent current and voltage of collector to base bias arrangement using the Following data: V_{cc}= 10 V, R_b= 100 K, R_c = 2 K, β = 50 and also specify a value of R_b so that V_{ce} = 7 V. (7M)

7. a) Derive the expressions for Z_i, Z_o and Av for common drain J-FET amplifier (7M)
   b) Determine the h-parameters for common emitter configuration from the characteristic curves (7M)

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