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

II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019
ELECTRONIC DEVICES AND CIRCUITS
(Com to ECE, EIE and 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**

~~~~~~

PART –A

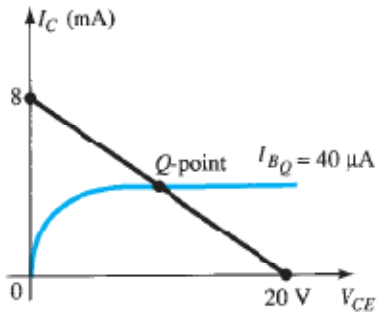
1.	a)	What is Fermi Dirac function? Explain its significance.	(3M)
	b)	What is varactor diode?	(2M)
	c)	Define regulation and efficiency of a rectifier.	(2M)
	d)	Define drain resistance and amplification factor of an FET.	(2M)
	e)	What is meant by thermal runaway? Explain.	(3M)
	f)	When the emitter resistor is bypassed by the capacitor, how is the gain of the amplifier affected?	(2M)

PART -B

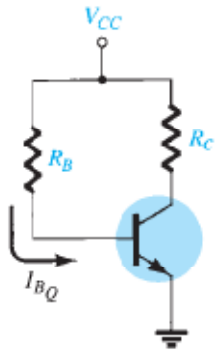
2.	a)	Explain about p-type and n-type semiconductors.	(5M)
	b)	In a p-type semiconductor, the Fermi level lies 0.3 eV above the valance band at a room temperature of 300 ^{0}K. Determine the new position of Fermi level for a temperature of (i) 350 ^{0}K and (ii) 400 ^{0}K.	(9M)
3.	a)	Draw the energy band diagram of a p-n junction under open circuit condition and derive the expression for contact potential.	(7M)
	b)	The voltage across a silicon diode at room temperature is 0.7 V when 2 mA current flows through it. If the voltage increases to 0.75 V, calculate the diode current. Assume V_T = 26 mV.	(7M)
4.	a)	Draw the circuit diagram of Half-wave rectifier and derive the expressions for average value, R.M.S value and voltage drop across diode.	(7M)
	b)	What is meant by ripple factor and derive the expression for HWR.	(7M)
5.	a)	Explain various current components in Bipolar Junction Transistor.	(7M)
	b)	Explain the Vds/Ids characteristics and operation of depletion type MOSFET. With suitable diagram.	(7M)

||''|'''|''|'|''''||
~~~~~~

6. a) (i)What is meant by transistor biasing? Why it is needed? Explain. (4+4M)
   (ii)Define thermal runaway and thermal stability
   b) Given the device characteristics in figure (a), determine the V_{CC}, R_C and R_B in figure (b). (6M)



(a)



(b)

7. Derive the expressions for current gain, input resistance, voltage gain and output resistance of a common emitter amplifier with an emitter resistance. (14M)

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

II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019
ELECTRONIC DEVICES AND CIRCUITS
(Com to ECE, EIE and 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**

~~~~~~

PART –A

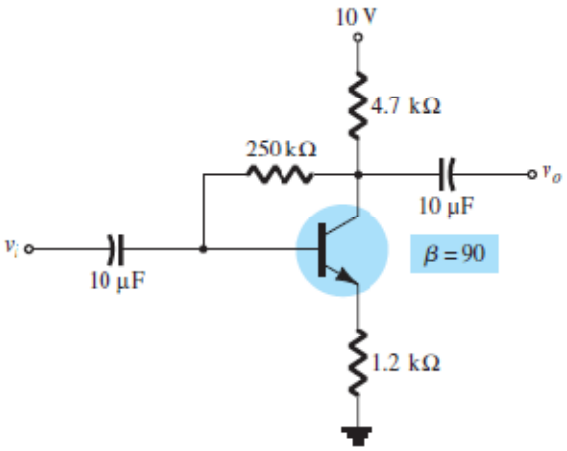
1.	a)	Compare drift current and diffusion cuttent.	(2M)
	b)	What is intrinsic standoff ratio of UJT?	(2M)
	c)	Draw FW Bridge rectifier and its output waveform?	(2M)
	d)	What is early effect? Mention its effects.	(3M)
	e)	Write the relation between stability factors?	(2M)
	f)	What are the advantages of h-parameters for transistor?	(3M)

PART -B

2.	a)	What is Hall effect? What properties of semiconductor are determined from a Hall effect?	(7M)
	b)	In a N-type semiconductor, the Fermi level lies 0.3 eV below the conduction band at a room temperature of 300 ^{0}K. If the temperature is increased to 360 ^{0}K, Determine the new position of Fermi level.	(7M)
3.	a)	Define transition capacitance in a diode and derive the expression for it.	(7M)
	b)	The reverse saturation current of a silicon PN junction diode is 10 μA. Calculate the diode current for the forward-bias voltage of 0.6 V at 25 ^{0}C.	(7M)
4.	a)	Derive the expression for ripple factor of a full-wave rectifier with capacitor filter.	(7M)
	b)	A diode whose internal resistance is 20 Ω to supply power to a 1000 Ω load from 110 V (rms) source of supply. Calculate (a) the peak load current (b) the dc load current (c) the ac load current (d) the dc diode voltage.	(7M)
5.	a)	Explain drain-source characteristics and transfer characteristics of JFET.	(7M)
	b)	Explain about Ebers-Moll model of a transistor.	(7M)
~~~~~~

6. a) Explain how the self bias establishes the stable operating point. (7M)

   b) For the circuit shown below, determine I_B, I_C and V_{CE}. (7M)



7. Explain about simplified common emitter hybrid model and derive the expressions for current gain, input impedance, voltage gain and output impedance. (14M)

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

II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019
ELECTRONIC DEVICES AND CIRCUITS
(Com to ECE, EIE and 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**

~~~~~~

PART –A

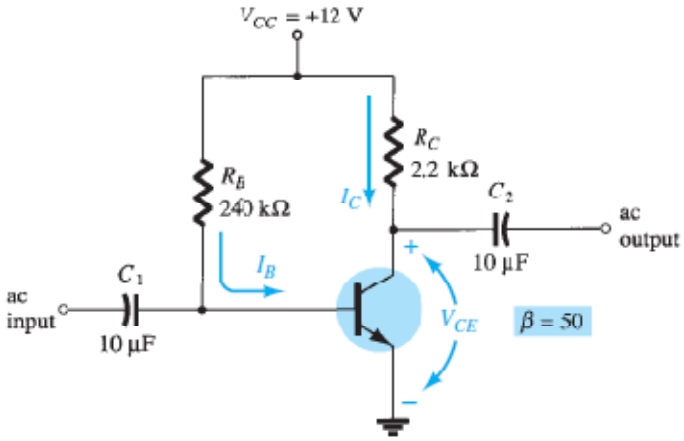
1.	a)	Draw the energy band diagrams of metals, semiconductors and Insulators.	(3M)
	b)	Define static resistance and dynamic resistance of a p-n diode.	(2M)
	c)	Define ripple factor of a rectifier.	(2M)
	d)	Write the working principle of photo transistor.	(2M)
	e)	Define operating point.	(2M)
	f)	Compare CE, CB and CC amplifier configurations.	(3M)

PART -B

2.	a)	What is continuity equation? Explain.	(7M)
	b)	With necessary equations, explain the concept of mobility and conductivity.	(7M)
3.	a)	Explain V-I characteristics of a tunnel diode and write its applications.	(7M)
	b)	Determine the diode current at 20 ^{0}C for a silicon diode with I_0 = 50 nA and applied forward bias of 0.6 V. Repeat the same for 30 ^{0}C and comment on the results.	(7M)
4.	a)	With necessary waveforms, explain the operation of bridge rectifier.	(7M)
	b)	Show that the maximum dc output power in half-wave rectifier occurs when the load resistance is equals to the diode forward resistance R_f.	(7M)
5.	a)	Explain about input and output characteristics of a transistor when it is connected in common emitter configuration.	(7M)
	b)	Discuss the operation of enhancement MOSFET at different regions with suitable figures and equations.	(7M)
~~~~~~

6. a) Explain about diode compensation for V_{BE} and I_{CO}. (7M)

   b) For the circuit shown below, determine I_B, I_C, V_{CE}, V_B, V_C and V_{BC}. (7M)



7. Sketch the circuit of CS amplifier and derive the expression for voltage gain at low frequencies. (14M)

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

II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019
ELECTRONIC DEVICES AND CIRCUITS
(Com to ECE, EIE and 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**

~~~~~~

PART –A

1. a) Explain the difference between intrinsic and extrinsic semiconductors (2M)
   b) Draw Zener diode Voltage regulator. (2M)
   c) What is a rectifier and mention types of rectifiers. (2M)
   d) List out few comparisons of BJT and FET (3M)
   e) What is Thermal stability in basing? (3M)
   f) Explain the determination of h-parameters of a two port network (2M)

PART –B

2. a) What is Fermi Dirac function and explain its importance in intrinsic and extrinsic semiconductors with example (7M)
   b) Explain the concept of electrons and holes in intrinsic semiconductors, extrinsic semiconductors along with examples (7M)

3. a) Explain the following terms (i) Static resistance (ii) Dynamic resistance (iii) Junction resistance (iv)Reverse resistance of a Diode with suitable figures. (7M)
   b) Draw the circuit diagram of SCR and explain its operation along with its characteristics (7M)

4. a) In a Half –wave rectifier an AC voltage of peak value 24V is connected in series with a silicon diode and load resistance of 480Ω, Find the peak current flowing through the diode (7M)
   b) Derive the expression for the ripple factor in a full-wave rectifier using inductor filter and explain its operation (7M)

5. a) Justify why are N-channel MOSFETs preferred over P-channel MOSFET (2M)
   b) Define and explain the parameters trans-conductance g_m. Drain resistance r_d and amplification factor μ of a JFET. Establish a relation between them. (12M)

6. a) Draw the circuit diagram of fixed bias and derive the expression for Stability factor for it (7M)
   b) Explain the different methods of FET bias and how to stabilization for it (7M)

7. a) Derive the Current Gain A_i , Input Impedance Z_i, Voltage amplification factor A_v and output admittance Y_0 of a Transistor amplifier using h-parameters. And its explain its operation (14M)

||''|'''|''|'|'''||
~~~~~~