Patuakhali Science and Technology University

B.Sc.Engg.(CSE) Level-1 Semester-II Final Examination-2021 (July-December)
Course Code: EEE 121 Course Title: Electronic Devices and Circuits
Credit Hour: 3.0 Full Marks: 70 Duration: 3 Hours.

[Figures in the right margin indicate full marks. Split answering of any question is not recommended.]

Answer any 5 of the following questions.

1	(a)	Define *semiconductor*. Write down the effect of temperature on *semiconductor*.	03
	(b)	What is a *pn* junction? Draw and explain the *V-I* characteristics of a *pn* junction.	04
	(c)	What do you meant by *crystal diode*? How does a crystal diode work as a switch?	03
	(d)	A crystal diode having internal resistance 40Ω is used for half-wave rectification. If the applied voltage $V = 60 \sin wt$ and load resistance is 500Ω. Find (i) I_{max}, I_{dc}, I_{rms} (ii) a.c. power input and d.c. power input (iii) d.c. output voltage (iv) efficiency of rectification	04
2	(a)	Define *ripple factor*. "The ripple factor of full-wave rectification is less than that of the half-wave rectification". Explain the statement.	05
	(b)	"A full-wave rectifier is twice as effective as a half-wave rectifier". Justify the statement.	05
	(c)	The four diodes used in a bridge rectifier circuit have forward resistances which may be considered constant at 1Ω and infinite reverse resistance. The alternating supply voltage is 300V r.m.s. and load resistance is 250 Ω. Calculate (i) mean load current and (ii) power dissipated in each diode.	04
3	(a)	Describe the action of the following filter circuits: (i) *capacitor filter* (ii) *choke input filter* (iii) *capacitor input filter*.	05
	(b)	Define *transistor*. Derive the expression for the collector-current in common emitter connection of transistor.	04
	(c)	A transistor is connected in *common-emitter (CE)* configuration in which collector supply is 20V and the voltage drop across 800Ω load resistance connected in the collector circuit is 0.5V. If α=0.96, calculate: i. collector-emitter voltage ii. base current.	03
	(d)	Write down the advantages and disadvantages of *transistors* over *vacuum tubes*.	02
4	(a)	Define *sinusoidal oscillator*. Write down the advantages of *sinusoidal oscillator*. Why an *alternator* can not be called *oscillator*?	04
	(b)	What is *tank circuit*? Describe the construction and circuit operation of the tuned collector oscillator.	05
	(c)	A *1 pF* capacitor is available. Choose the inductor values in a *Hartley oscillator* so that *f*= *1 MHz* and $m_v = 0.2$.	03
	(d)	Write down the limitations of *LC* and *RC* oscillators.	02
5	(a)	What is a *photo diode*? Explain the operating principle of *photo diode* with example.	04
	(b)	Define *JFET*. Describe the working principle of *JFET*.	04
	(c)	What is *MOSFET*? Discuss the circuit operations of *D-MOSFET*.	06
6	(a)	Explain the construction and operation of a *UJT*.	04
	(b)	Define *triac*. Describe the construction and operation of a triac circuit.	04
	(c)	What do you meant by *SCR*? Explain the construction and working principle of an *SCR*.	04
	(d)	Sketch the *V-I* characteristics of a *diac*.	02

[D]		Write a Java program to print a pyramid using star pattern. Number of rows input from keyboard.
[A]		What is the static variable? Explain a java program with and without static variable.
[B]	i)	What is the difference between static (class) method and instance method?
	ii)	What are the main uses of this keyword?

Patuakhali Science and Technology University

B.Sc.Engg.(CSE) Level-1 Semester-II Final Examination-2020 (July-December)
Course Code: EEE 121 Course Title: Electronic Devices and Circuits
Credit Hour: 3.0 Full Marks: 70 Duration: 3 Hours.

[Figures in the right margin indicate full marks. Split answering of any question is not recommended.]

Answer any 5 of the following questions.

1	(a)	What do you meant by *crystal diode*? How does a *crystal diode* work as a switch?	03
	(b)	"A full-wave rectifier is twice as effective as a half-wave rectifier". Justify the statement.	07
	(c)	A crystal diode having internal resistance 50Ω is used for half-wave rectification. If the applied voltage $V = 50 \sin wt$ and load resistance is 400Ω. Find (i) I_{max}, I_{dc}, I_{rms} (ii) a.c. power input and d.c. power input (iii) d.c. output voltage (iv) efficiency of rectification	04
2	(a)	Define *ripple factor*. "The ripple factor of full-wave rectification is less than that of the half-wave rectification". Explain the statement.	05
	(b)	Describe the action of the following filter circuits: (i) capacitor filter (ii) choke input filter (iii) capacitor input filter.	06
	(c)	The four diodes used in a bridge rectifier circuit have forward resistances which may be considered constant at 1Ω and infinite reverse resistance. The alternating supply voltage is 250V r.m.s. and load resistance is 400 Ω. Calculate (i) mean load current and (ii) power dissipated in each diode.	03
3	(a)	What is *tunnel diode*? Explain the tunneling effect and *V-I* characteristics of tunnel diode.	04
	(b)	Define *transistor*. Derive the expression for the collector-current in common base connection of transistor.	04
	(c)	A transistor is connected in common-emitter (CE) configuration in which collector supply is 10V and the voltage drop across 800Ω load resistance connected in the collector circuit is 0.6V. If α=0.96, calculate: i. collector-emitter voltage ii. Base current.	03
	(d)	Write down the pros and cons of the transistor over vacuum tubes.	03
4	(a)	Define *sinusoidal oscillator*. Write down the advantages of sinusoidal oscillator. Why an alternator can not be called oscillator?	03
	(b)	What is *tank circuit*? Describe the construction and circuit operation of the *hartley oscillator*.	04
	(c)	What is *photo-diode*? Describe the operating principle and applications of photo-diode.	04
	(d)	A 1 MHz inductor is available. Calculate the capacitor values in a Colpitts oscillator so that f= 1 MHz and m_v=0.25.	03
5	(a)	Define *JFET*. Describe the working principle of *JFET*. Write down the advantages of *JFET*.	06
	(b)	Explain the construction and working of *UJT*.	03
	(c)	What is *MOSFET*? Explain the circuit operation of *D-MOSFET*.	05
6	(a)	What do you meant by *SCR*? Explain the construction and working principle of *SCR*.	05
	(b)	Define *triac*. Describe the construction and operation of *triac* circuit.	05
	(c)	What is *diac*? Write down the operating principle of *diac*.	04

Patuakhali Science and Technology University

B.Sc.Engg.(CSE) Level-1 Semester-II Final Examination-2019 (July-December)

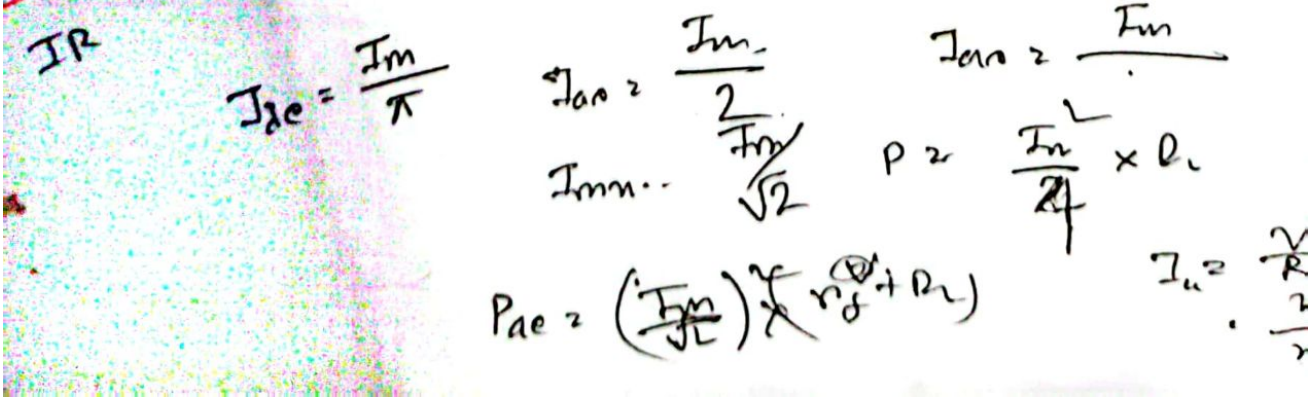
Course Code: EEE 121 Course Title: Electronic Devices and Circuits

Credit Hour: 3.0 Full Marks: 70 Duration: 3 Hours.

[Figures in the right margin indicate full marks. Split answering of any question is not recommended.]

Answer any 5 of the following questions.

1	(a)	"A full-wave rectifier is twice as effective as a half-wave rectifier". Justify the statement.	06
	(b)	What do you meant by *crystal diode*? How does a crystal diode work as a switch?	04
	(c)	An a.c. supply of *250 V* is applied to a half-wave rectifier circuit through a transformer of turn ratio *10:1*. Find (i) the output d.c. voltage and (ii) the peak inverse voltage. Consider the diode to be ideal.	04
2	(a)	How does the full-wave bridge rectifier work? Write down the pros and cons of full-wave bridge rectifier circuit.	05
	(b)	Describe the action of the following filter circuits: (i) capacitor filter (ii) choke input filter (iii) capacitor input filter.	04
	(c)	What is *ripple factor*? "The ripple factor of full-wave rectification is less than that of the half-wave rectification". Explain the statement.	03
	(d)	Write down the advantages and disadvantages of crystal diode over vacuum diodes.	02
3	(a)	Define *photo-diode*. Write down the operating principle and applications of photo-diode.	05
	(b)	What is *transistor*? Derive the expression for the collector-current in common collector connection of transistor.	04
	(c)	The collector leakage current in a transistor is *250 μA* in CE arrangement. If the transistor is connected in CB arrangement, what will be the leakage current? Given that $\beta=100$.	03
	(d)	Compare the characteristics of three transistor connections.	02
4	(a)	Define *faithful amplification*. Analyze the base resistor circuit for transistor biasing. Write down the advantages and disadvantages of base resistor method.	05
	(b)	What is *oscillatory circuit*? Describe the construction and circuit operation of the *Colpitt's oscillator*.	04
	(c)	A germanium transistor is to be operated at zero signal $I_c = 1$ *mA*. If the collector supply $V_{cc} = 15$ *V*, what is the value of R_B in the base resistor method. Given that $\beta=120$.	03
	(d)	Write down the limitations of *LC* and *RC* oscillators.	02
5	(a)	Define *JFET*. Describe the construction and working principle of JFET.	05
	(b)	Differentiate between *JFET* and *bipolar transistor*.	03
	(c)	What is *MOSFET*? Compare the characteristics of *D-MOSFET* and *E-MOSFET*.	03
	(d)	A *1 pF* capacitor is available. Choose the inductor values in a Hartley oscillator so that $f=$ *1 MHz* and $m_v = 0.2$.	03
6	(a)	What do you meant by *SCR*? How does SCR act as a mechanical switch?	03
	(b)	Define *diac*. How does a diac work as lamp dimmer?	03
	(c)	What is *triac*? Describe the construction and operation of triac circuit.	03
	(d)	Which value of β to be used for transistor biasing? What are the requirements for biasing the transistor circuit?	03
	(e)	Derive the expression for finding *stability factor*.	02



Patuakhali Science and Technology University

B.Sc. Engg. (CSE) Level: 1 Semester: II Semester Final Examination Session 2016-17

Course Code: EEE 121 Course Title: Electronic Devices and Circuits

Credit Hour: 03 Full Marks: 70 Duration: 03 Hours

[Figures in the right margin indicate full marks. Split answering of any question is not recommended]

Answer any 5 of the following questions

1	a)	What is stabilization? Describe the reasons for which stabilization is necessary.	3
	b)	A transistor employs a 4kΩ load and V_{cc}= 13 V. What is the maximum input signal if β=100? Given V_{knee}=1V and a change of 1V in V_{BE} causes a change of 5mA in collector current.	3
	c)	Discuss intrinsic and extrinsic semiconductor.	4
	d)	What is a zener diode? Explain how zener diode maintains constant voltage across the load.	4
2	a)	Discuss the mechanism of hole current flow in semiconductor.	3
	b)	Draw and discuss the equivalent circuits of a crystal diode.	3
	c)	A half wave rectifier uses a transformer turns ratio 5:2. If the primary voltage is 250 V(r.m.s), find (i) d.c output voltage (ii) peak inverse voltage. Assume the diode to be ideal.	3
	d)	What is a tunnel diode? Explain the V-I characteristics of a tunnel diode.	3
	e)	Write short notes on LED.	2
3	a)	Derive the expression for collector current of common emitter connection. Discuss input and output characteristics of CE connection.	5
	b)	Describe voltage divider bias method. State advantages and disadvantages of voltage divider bias method.	4
	c)	Find the value of I_c for potential divider method if V_{cc}=12V, R_E=1KΩ, R_1=39KΩ, R_2=10KΩ, R_c=2.7KΩ, V_{BE}=0.15V and β=50.	3
	d)	Write short notes on stabilization of operating point.	2
4	a)	What is phase reversal? For the voltage divider transistor amplifier circuit, R_1 = 10kΩ, R_2 = 5kΩ, R_C = 2kΩ and R_E = 1kΩ.	7
		i) Draw d. c. load line	
		ii) Determine the operating point	
		iii) Draw a.c. load line. Assume V_{BE}=0.7V	
	b)	"The power gain of transistor amplifier is the product of current and voltage gain". Justify the statement.	3
	c)	Draw the block diagram of transistor audio power amplifier. Write down the role of capacitors in transistor amplifiers.	4
5	a)	Draw direct coupled amplifier circuit. Why does transformer coupling give poor frequency response?	3
	b)	Explain the push-pull amplifier with a neat diagram.	3
	c)	Write down the operation of Colpitt's Oscillator with necessary diagram.	3

d) The base current of a Class A amplifier is 10mA peak. Calculate the (i) output power (ii) input power (iii) collector efficiency of the amplifier circuit shown in fig. 5(d) 3

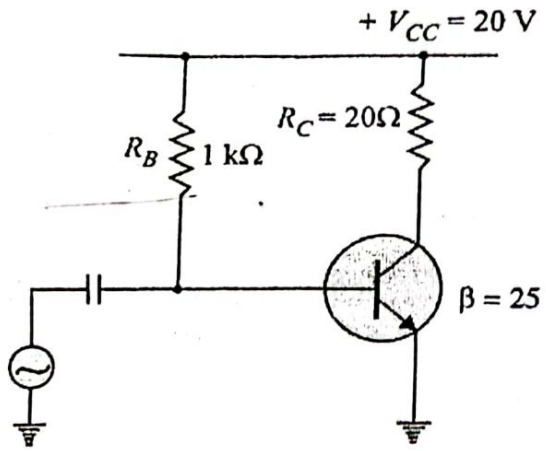


Fig. 5(d)

e) Why FET is better than BJT? 2

6 a) Why JFET is called constant current source? Explain with working principle. 3

b) What are the differences between JFET and MOSFET? Show that "CMOS works as an inverter". 3

c) Why is SCR always turned on by gate current? Suppose a SCR is turned ON condition, if the gate voltage is removed at this moment. What will be happened? 3

d) Discuss working principle of a DIAC with VI curve. 3

e) Show the construction and equivalent circuit of a TRAIC. 2

$V_{pm} = V_2 + 25$ 0

2/5

EEE-15

Patuakhali Science and Technology University
B.Sc.Engg (CSE) Level-1, Semester-II Final Examination-2015 (July-December)
Course Code: EEE 121 Course Title: Electronic Devices and Circuits
Credit Hour: 3.0 Full Marks: 70 Duration: 3 Hours.

[Figures in the right margin indicate full marks. Split answering of any question is not recommended]

Answer any 5 of the following questions

[1]	a.	Discuss the behavior of a p-n junction under forward and reverse biasing.	04
	b.	Discuss intrinsic and extrinsic semiconductor.	04
	c.	Drive an expression for the efficiency of a full-wave rectifier.	04
	d.	Why amplifier circuit is necessary in an oscillator?	02
[2]	a.	Write down the formation or construction of Silicon Controlled Rectifier (SCR). Explain it's working procedure with an equivalent circuit of SCR.	05
	b.	What is TRIAC and why it is used instead of SCR in a circuit? Briefly explain TRIAC's working procedure with its *I-V* characteristics.	05
	c.	Show that the output voltage of a single stage common emitter transistor amplifier is 180° out of phase with the input voltage.	04
[3]	a.	Describe common base transistor connection for finding current amplification factor and collector current.	04
	b.	A transistor is connected in common emitter configuration in which collector supply is 8V and the voltage drop across resistance R_C connected in the collector circuit is 0.5V. The value of R_C= 800Ω If α =0.96, determine: (i) collector-emitter voltage (ii) base current	03
	c.	What is a zener diode? Draw and describe the equivalent circuit of a zener diode in the breakdown region.	04
	d.	A transistor employs a 4kΩ load and V_{cc}= 13 V. What is the maximum input signal if β=100? Given $V_{BE(on)}$=1V and a change of 1V in V_{BE} causes a change of 5mA in collector current.	03
[4]	a.	What is stabilization? Describe the reasons for which stabilization is necessary.	03
	b.	Describe biasing with collector feedback resistor. What are the advantages and disadvantages of this method?	03
	c.	It is desired to set the operating point at 2V, 1mA by biasing a silicon transistor with collector feedback resistor R_B. If β=100, Find the value of R_B.	02
	d.	Describe the action of the following filter circuits: i) Capacitor filter ii) Choke input filter iii) Capacitor input filter.	04
	e.	Define multistage transistor amplifier circuit. Classify types of coupling and types of multistage amplifier.	02
[5]	a.	Define sinusoidal oscillator. Write down the advantages of sinusoidal oscillator.	03
	b.	Draw and describe the operation of a tuned collector oscillator.	04
	c.	What do you understand by damped and undamped electrical oscillations?	03
	d.	Describe the role of capacitors in transistor amplifiers.	04
[6]	a.	Define FET. Describe construction and working of JFET.	04
	b.	What are the difference between JFET and BJT?	03
	c.	What do you understand by MOSFET? Classify MOSFET and describe each type.	05
	d.	What is a LED? Explain the working principle of a LED.	02

EEE-2014

July

Patuakhali Science and Technology University

B.Sc.Engg.(CSE) Level-I, Semester-II Final Examination-2014 (July-December)

Course Code: EEE 121 Course Title: Electronic Devices and Circuits

Session: 2013-14 Credit Hour: 3.0 Full Marks: 70 Duration: 3 Hours.

[Figures in the right margin indicate full marks. Split answering of any question is not recommended]

Answer any 5 of the following questions

[1] a. Drive an expression for the efficiency for a full wave rectifier. 04

b. What is filter circuit? Describe different types of filter circuits. 05

c. Draw the equivalent circuit of an ideal zener in the breakdown region. Explain how zener diode maintain constant voltage across the load. 05

[2] a. What is faithful amplification? Explain the conditions to be fulfilled to achieve faithful amplification in a transistor amplifier. 04

b. A transistor is connected in common emitter configuration in which collector supply is 8V and the voltage drop across resistance Rc connected in the collector circuit is 0.5V. The value of Rc= 800Ω. If α =0.96, determine: (i) collector-emitter voltage (ii) base current 03

c. What is stabilization? Describe the reasons for which stabilization is necessary. 03

d. It is desired to set the operating point at 2V, 1mA by biasing a silicon transistor with collector feedback resistor R_B. If β=100, Find the value of R_B. 02

e. Why is collector current is slightly less than emitter current? 02

[3] a. Explain transistor RC coupled amplifier with special reference to frequency response, advantages, disadvantages and applications. 05

b. Draw the circuit of a practical single stage transistor amplifier. Explain the function of each component. 04

c. In a transistor amplifier, the collector current swings from 2 mA to 5mA as the base current is changed from 5 μA to 15μA. Find the current gain. 02

d. Find the value of I_c for potential divider method if V_{cc}=9V, R_E=1KΩ, R_1=39KΩ, R_2=10KΩ, R_c=2.7KΩ, V_{BE}=0.15V and β=90. 03

[4] a. Explain the operation of a tank circuit with neat diagram. 03

b. Discuss the essentials of an oscillator. Discuss the circuit operation of tuned collector oscillator. 05

c. Why is an amplifier circuit necessary in an oscillator? 02

d. Explain the following terms: (i) Frequency response (ii) Decibel gain (iii) Bandwidth 04

[5] a. Write down the differences between JFET and BJT. 02

b. Explain the construction and working of a JFET. 04

c. Define the JFET parameters and establish the relationship between them. 03

d. Explain the construction and working of MOSFET. Write down difference between MOSFET and JFET. 05

[6] a. What is triac? Explain the construction and working of a triac. 04

b. Explain the construction and working of UJT. Draw and describe the characteristics of UJT. Write down the advantages of UJT. 05

c. What is SCR? Explain working of SCR. Draw the V-I characteristics of an SCR. What do you infer from V-I characteristics? 05