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SET - 1

II B. Tech I Semester Supplementary Examinations, June - 2015 BASIC ELECTRONICS AND DEVICES

(Electrical and Electronics Engineering)

Time: 3 hours

Code No: RT21023

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 THREE Questions from Part-B

<u>PART –A</u>

1	a)	Mobility of electrons and holes for Ge are more than Si.Justify.	(4M)
	b)	Explain the operation of Varactor diode in brief?	(4M)
	c)	Briefly explain over load voltage protection.	(3M)
	d)	Draw Hybrid model of transistor for CB configuration.	(4M)
	e)	Draw MOSFET Characteristics-static and Transfer (enhancement and depletion mode).	(4M)
	f)	What is the significance of lead and lag networks in Wein bridge oscillator.	(3M)
		PART -B	
2	a)	Explain the following terms:	(8M)
	b)	What do you mean by step graded junction? Derive the expression for diffusion capacitance.	(8M)
3	a)	What is the significance of breakdown in junctions? Explain Avalanche and Zener break down	(8M)
	b)	Explain the concept of tunneling with energy band diagrams.	(8M)
4	a)	Draw the diagram of shunt voltage regulator and explain in detail	(8M)
	b)	Draw the circuit diagram of full wave rectifier with L-section filter and explain its operation	(8M)
5	a)	Why biasing a transistor? What is the significance of biasing circuits? explain.	(8M)
	b)	Why self bias circuit is prefered than other biasing circuits? Derive the expression for stability factor of self bias circuit.	(8M)
6	a)	Explain principle of operation of power IGBT and power MOSFET and mention their ratings.	(8M)
	b)	What are the advantages of JFET over BJT? JFET is the voltage control device. Justify.	(8M)
7	a)	Draw the block diagram of a feedback amplifier and explain each block giving Its function.	(8M)
	b)	What is non-linear distortion? Discuss the causes for this type of distortion in amplifiers	(8M)



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SET - 2

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

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<u>PART –A</u>

1	a)	Define and compare drift and diffusion currents?	(3M)
	b)	Explain operation of PIN diode in brief.	(3M)
	c)	PIV of Half wave rectifier and Bridge rectifier is same. Justify.	(3M)
	d)	What is an operating point? How to overcome shifting of an operating point.	(4M)
	e)	Compare JFET and MOSFET.	(3M)
	f)	What is the major differences in normal amplifier and power amplifier	(3M)
		PART -B	
2	a)	What is Fermi-level? Prove that the Fermi level in an 'n'-type material is much Closed to conduction band	(8M)
	b)	Define Hall effect and Continuity Equation and write their applications.	(8M)
3		Derive the current expression for P-N junction diode	(16M)
4	a)	Show that TUF for bridge rectifier is 0.693	(8M)
	b)	Explain the operation of bridge rectifier with waveforms.	(8M)
5	a)	Define the stability factors S , S'and S'' and derive the relation between them.	(8M)
	b)	Define Thermal runaway ,how to overcome this?	(8M)
6	a)	Draw low frequency model of FET and list out advantages over BJT.	(8M)
	b)	Draw the equivalent circuit of common source FET amplifier and derive the expression for voltage gain.	(8M)
7	a)	What is the Condition for sustained oscillations and draw and explain the RC-phase shift oscillators with Transistor	(8M)
	b)	State the merits of push pull configuration. Describe the operation of class B push pull amplifier.	(8M)

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SET - 3

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Time: 3 hours

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Code No: RT21023

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 THREE Questions from Part-B

#### PART –A

| 1       | a) | Define Hall effect? List out applications                                                                                                                                                                     | (3M)  |  |
|---------|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|--|
|         | b) | Draw the V-I characteristics of tunnel diode and list out applications.                                                                                                                                       | (3M)  |  |
|         | c) | Draw the circuit daigram of Zener regulator and discuss its function in brief.                                                                                                                                | (3M)  |  |
|         | d) | Derive the expression for stability factor of fixed bais circuit.                                                                                                                                             | (3M)  |  |
|         | e) | Discuss the principle of operation of power IGBT .                                                                                                                                                            | (3M)  |  |
|         | f) | What are the conduction angles of ClassA, ClassAB, ClassC and ClassD                                                                                                                                          | (4M)  |  |
| PART -B |    |                                                                                                                                                                                                               |       |  |
| 2       | a) | Define Fermi-level? Why the Fermi level in an 'n'-type material is much Closed to conduction band? Justify.                                                                                                   | (8M)  |  |
|         | b) | Derive the expression for determination of minority chagre carriers in N-type<br>and P-type semiconductors                                                                                                    | (8M)  |  |
| 3       |    | Explain the operation of P-N junction diode and derive the expression for diode equestion.                                                                                                                    | (16M) |  |
| 4       | a) | Define the following terms w.r.t FWR circuit.<br>(i) PIV ( ii) Average d.c. voltage (iii) RMS current (iv) Ripple factor.                                                                                     | (8M)  |  |
|         | b) | In a full wave rectifier the required dc voltage is 15V and the diode drop is 0.7V Calculate ac rms input voltage required in case of bridge rectifier circuit and Centre tapped full wave rectifier circuit. | (8M)  |  |
| 5       | a) | Show that transistor acts as an amplifier and switch.                                                                                                                                                         | (8M)  |  |
|         | b) | With neat diagram explain the various current components in a pnp transistor.                                                                                                                                 | (8M)  |  |
| 6       | a) | Discuss the Principle of operation and draw characteristics of Silicon control rectifier (SCR).                                                                                                               | (8M)  |  |
|         | b) | Draw the common source FET amplifier and its equivalent circuit and derive the expressions for $A_{\rm v}$ and $R_{\rm i}$                                                                                    | (8M)  |  |
| 7       | a) | List out various types of distortions that occur in transistor amplifiers. Discuss the causes for each.                                                                                                       | (8M)  |  |
|         | b) | What is the Condition for sustained oscillations and explain the RC-phase shift oscillators with neat diagram.                                                                                                | (8M)  |  |



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| Code No: RT21023 |                                                                                                                                            | No: RT21023 R13 SE                                                                                                                                                                                     | Γ-4     |  |  |  |  |  |
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|                  | II B. Tech I Semester Supplementary Examinations, June - 2015<br>BASIC ELECTRONICS AND DEVICES<br>(Electrical and Electronics Engineering) |                                                                                                                                                                                                        |         |  |  |  |  |  |
| Т                | ime:                                                                                                                                       | 3 hours Max. Ma                                                                                                                                                                                        | rks: 70 |  |  |  |  |  |
|                  |                                                                                                                                            | <ul> <li>Note: 1. Question Paper consists of two parts (Part-A and Part-B)</li> <li>2. Answer ALL the question in Part-A</li> <li>3. Answer any THREE Questions from Part-B</li> </ul>                 |         |  |  |  |  |  |
|                  |                                                                                                                                            | <u>PART –A</u>                                                                                                                                                                                         |         |  |  |  |  |  |
| 1                | a)                                                                                                                                         | Explain mass action law in brief.                                                                                                                                                                      | (3M)    |  |  |  |  |  |
|                  | b)                                                                                                                                         | Draw the V-I characteristics of SCR and list out applications.                                                                                                                                         | (3M)    |  |  |  |  |  |
|                  | c)                                                                                                                                         | Prove that ripple factor of half wave rectifier is 1.21.                                                                                                                                               | (3M)    |  |  |  |  |  |
|                  | d)                                                                                                                                         | Derive the expression for stability factor of collector to base bias circuit.                                                                                                                          | (3M)    |  |  |  |  |  |
|                  | e)                                                                                                                                         | Draw the drain and transfer Characteristics JFET.                                                                                                                                                      | (4M)    |  |  |  |  |  |
|                  | f)                                                                                                                                         | What do you mean by cross over distortion. How to overcome it.                                                                                                                                         | (3M)    |  |  |  |  |  |
|                  |                                                                                                                                            | PART -B                                                                                                                                                                                                |         |  |  |  |  |  |
| 2                | a)                                                                                                                                         | Define Hall coefficient and derive the expression for it                                                                                                                                               | (8M)    |  |  |  |  |  |
|                  | b)                                                                                                                                         | Compare the 'p' type and 'n' type semiconductors                                                                                                                                                       | (8M)    |  |  |  |  |  |
| 3                | a)                                                                                                                                         | Explain the principle of operation of Varactor diode, LED and Photo diode                                                                                                                              | (8M)    |  |  |  |  |  |
|                  | b)                                                                                                                                         | What is the significance of breakdown in junctions? Explain Avalanche break down                                                                                                                       | (8M)    |  |  |  |  |  |
| 4                | a)                                                                                                                                         | Explain the operation of bridge rectifier with help of waveforms.                                                                                                                                      | (8M)    |  |  |  |  |  |
|                  | b)                                                                                                                                         | Why do we connect inductor in series with load and capacitor is in parallel with the load in L-section filter of rectifier circuit. Justify.                                                           | (8M)    |  |  |  |  |  |
| 5                | a)                                                                                                                                         | Derive the expressions for Voltage gain and current gain for CE amplifier.                                                                                                                             | (8M)    |  |  |  |  |  |
|                  | b)                                                                                                                                         | For a single stage transistor amplifier, RS=5K and RL= 20K the h-parameter                                                                                                                             | (8M)    |  |  |  |  |  |
|                  |                                                                                                                                            | values are $h_{fe} = 50$ , $h_{ie} = 1.1 K \Omega$ , $h_{re} = 2.5 \times 10^{-4}$ , $h_{Oe} = 25 \mu$ A/V. Find AI; AV; AVS; R <sub>i</sub> , and R <sub>O</sub> for the CE transistor configuration. |         |  |  |  |  |  |
| 6                | a)                                                                                                                                         | Explain working principle of enhancement mode MOSFET with a neat diagram                                                                                                                               | (8M)    |  |  |  |  |  |
|                  | b)                                                                                                                                         | Give the symbols and comparison of various power devices                                                                                                                                               | (8M)    |  |  |  |  |  |
| 7                | a)                                                                                                                                         | State the merits of push pull configuration. Describe the operation of class B push pull amplifier.                                                                                                    | (8M)    |  |  |  |  |  |
|                  | b)                                                                                                                                         | What is the Condition for sustained oscillations and explain the RC-phase shift oscillators with neat diagram.<br>1  of  1                                                                             | (8M)    |  |  |  |  |  |