

**II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2018****BASIC ELECTRONICS AND DEVICES**

(Electrical and Electronics Engineering)

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**

1. a) Define hole and explain how they move in semiconductor. (3M)
- b) What is meant by tunneling? (2M)
- c) Draw the circuit diagram of L-section filter and write the expression for ripple factor. (3M)
- d) What are the different configurations of BJT? (2M)
- e) Why a field effect transistor is called so? (2M)
- f) Give the comparison of power amplifiers in terms of operating cycle and efficiency. (2M)

**PART -B**

2. a) Explain the diffusion concept in semiconductors with necessary equations. (7M)
- b) Explain the concept of Generation and Recombination of charges. (7M)
3. a) Explain the following terms: (7M)  
(i) Static Resistance (ii) Dynamic Resistance (iii) cut-in voltage
- b) Explain the operation of Light Emitting Diode and write its applications. (7M)
4. a) What is regulation? Derive the expression for regulation for half-wave rectifier and full-wave rectifier. (7M)
- b) A full wave rectifier delivers 50 W to a load of  $200\ \Omega$ . If the ripple factor is 1 %, calculate ac ripple voltage across the load. (7M)
5. a) What is early effect? What are the consequences of it in BJT? Explain. (7M)
- b) Draw the circuit diagram of self bias circuit and derive the expression for stability factor S. (7M)
6. a) Explain the construction of N channel JFET and explain its operation. (7M)
- b) Explain the operation of power IGBT. (7M)
7. a) Draw the circuit diagram of RC phase shift oscillator and explain its operation. (7M)
- b) A voltage series negative feedback amplifier has a voltage gain without feedback of  $A = 500$ , input resistance  $R_i = 3\ \text{k}\Omega$ , output resistance  $R_o = 20\ \text{k}\Omega$  and feedback ratio  $\beta = 0.01$ . Calculate the voltage gain  $A_f$ , input resistance  $R_{if}$ , and output resistance  $R_{of}$  of the amplifier with feedback. (7M)



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**PART -A**

1. a) Write the difference between intrinsic and extrinsic semiconductors. (2M)
- b) What is PIN diode? (2M)
- c) Compare various rectifiers in terms of ripple factor. (2M)
- d) Define  $\alpha$  and  $\beta$ . Write the relationship between them. (3M)
- e) Write the application of FET. (2M)
- f) What are the advantages of negative feedback? (3M)

**PART -B**

2. a) What is meant by an energy band? Explain the classification materials based on energy band. (7M)
- b) Explain the concept of Injected minority carrier charge with necessary equations. (7M)
3. a) Discuss about current components in p-n junction diode. (7M)
- b) With the help of energy band diagrams, explain the operation of tunnel diode. (7M)
4. a) Draw the circuit diagram of rectifier with capacitor filter and explain how it reduces the ripples in the output. (7M)
- b) The turns ratio of the transformer used in a half wave rectifier is 2:1 and the primary is connected to 230 V, 50 Hz power mains. Assuming the diode is to be ideal, determine (i) dc voltage across the load (ii) PIV (iii) dc power delivered to the load having a resistance of 200  $\Omega$ . (7M)
5. a) Explain the input and output characteristics of NPN transistor in CC configuration. (7M)
- b) Determine the voltage gain, current gain, input impedance and output impedance of a CE amplifier using NPN transistor with  $h_{ie} = 1200 \Omega$ ,  $h_{re} = 0$ ,  $h_{fe} = 36$ ,  $h_{oe} = 2 \times 10^{-6}$  mhos,  $R_L = 2.5 \text{ k}\Omega$ ,  $R_S = 500 \Omega$ . (7M)
6. a) Explain the V-I characteristics of silicon controlled rectifier. (7M)
- b) Draw the low frequency model of FET and explain it. (7M)
7. a) Explain the basic principles behind push-pull amplifiers. (7M)
- b) Draw the circuit diagram of Wien bridge oscillator circuit and explain its operation. (7M)



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**PART -A**

1. a) State and explain mass action law. (3M)
- b) What is photo diode? Write its applications. (2M)
- c) Define ripple factor and write its significance. (2M)
- d) What are the drawbacks of fixed bias circuit? (2M)
- e) What are the advantages of MOSFET when compared to JFET? (2M)
- f) Write short notes on total harmonic distortion. (3M)

**PART -B**

2. a) What is meant by doping? How it improves the conductivity? Explain. (7M)
- b) Sketch the Fermi level in both intrinsic and extrinsic semiconductors. Also write the expressions for Fermi level in both intrinsic and extrinsic semiconductors. (7M)
3. a) What is meant by diffusion capacitance? Derive the expression for it. (7M)
- b) Explain in detail about avalanche breakdown and zener breakdown. Explain the effect of temperature on these two breakdown mechanisms. (7M)
4. a) Draw the circuit diagram of Bridge rectifier and explain its operation. Write the advantages of it. (7M)
- b) An ac supply of 230 V is applied to a half-wave rectifier circuit through transformer of turns ratio 5: 1. Assume the diode is an ideal one. The load resistance is 300  $\Omega$ . Find (i) dc output voltage (ii) PIV (iii) average value of the load current. (7M)
5. a) Explain how the transistor is used as an amplifier and switch. (7M)
- b) Draw the hybrid model of transistor in CE, CB and CC configuration. List out the advantages of transistor hybrid parameters. (7M)
6. a) Explain the construction details of depletion MOSFET and its transfer characteristics. (7M)
- b) Compare various power semiconductor devices. (7M)
7. a) Explain the concept of feedback and write the advantages of negative feedback. (7M)
- b) Draw the block diagram of an oscillator and explain it. (7M)

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**PART -A**

1. a) Write the Einstein relationship in semiconductors. (2M)
- b) Draw the symbols of tunnel diode, Zener diode, photo diode and LED. (2M)
- c) Define efficiency of a rectifier. (2M)
- d) What is meant by transistor biasing? (2M)
- e) List out the applications of SCR. (3M)
- f) Give the classification of power amplifiers. (3M)

**PART -B**

2. a) List out the properties of semiconductor and explain how these properties changes with respect to temperature. (7M)
- b) What is law of junction? Derive the expression for it. (7M)
3. a) Explain the operation of p-n diode in both forward and reverse bias conditions. (7M)
- b) Explain the operation of Varactor diode and write its applications. (7M)
4. a) Draw the circuit diagram of Zener diode regulator and explain its operation. (7M)
- b) In a bridge rectifier, the transformer is connected to 200 V, 60 Hz mains and the turn's ratio of the step down transformer is 11:1. Assuming the diode is ideal and load is  $600\Omega$ , find (7M)  
(i)  $I_{dc}$  (ii) voltage across the load (iii) PIV
5. a) Describe the all current components in bipolar junction transistor. (7M)
- b) Draw the collector to base bias circuit and explain it. (7M)
6. a) Explain the volt-ampere characteristics of enhancement MOSFET. (7M)
- b) Explain how the FET acts as an amplifier. (7M)
7. a) List out the different types of negative feedback configurations and draw their block diagrams. (7M)
- b) Explain about crystal oscillator. (7M)

