

II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019
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**

~~~~~  
**PART -A**

1. a) What is the forbidden gap? (2M)
- b) What are the applications of PN diodes? (2M)
- c) What is the need for voltage regulators? What are the drawbacks of Unregulated power supply? (3M)
- d) What is the relation between the currents of a transistor? (2M)
- e) What is depletion mode MOSFET draw its structure? (3M)
- f) What is the significance of feedback amplifier? (2M)

**PART -B**

2. a) Draw and compare the energy band diagram for metals, insulators, and semi conductor (6M)
- b) If the resistivity of p-type silicon specimen is  $0.12 \Omega\text{-m}$ , find the electron and hole concentration. (8M)
3. a) Explain V-I characteristics of tunnel diode with energy band diagram. (10M)
- b) Explain the working principal of a Photo diode. (4M)
4. a) Explain the working of a Half-wave rectifier with necessary waveforms and derive the expression for the ripple factor. (7M)
- b) A silicon diode having internal resistance is  $20\Omega$  is used for HWR. If the applied voltage is  $50\sin(\omega t)$  and load resistance is  $800\Omega$  find (7M)
  - (i)  $I_m$ ,  $I_{dc}$ ,  $I_{rms}$
  - (ii) ac input and dc output power
  - (iii) DC output voltage and efficiency
5. a) Draw the circuit diagram of a self-bias and derive the expression for stability factor. Why it is widely used. (7M)
- b) For a give BJT  $\alpha_{dc} = 0.92$ ,  $I_{CEO} = 10\mu A$ ,  $I_B = 30\mu A$  Determine the values of  $I_E$  and  $I_C$ . (7M)
6. a) Draw the Volt – amp characteristics of SCR for different value of Gate – Currents. (7M)
- b) Explain the principle of operation of a n-channel JFET and draw its  $I_D / V_{GS}$  characteristics. (7M)
7. a) Explain RC phase shift oscillator and derive its frequency of oscillation (7M)
- b) Derive distortion factor in power amplifier. (7M)

**II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019**  
**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**
- ~~~~~

**PART -A**

1. a) Draw energy band diagram of conducts/insulates/semi conducts? (2M)
- b) Define knee/cut-in/threshold voltage of a PN diode and Mention its applications. (2M)
- c) What is the need for a filter in rectifier? Draw all kinds of filters. (3M)
- d) Draw hybrid model of a transistor? (2M)
- e) List the three JFET parameters and their relation. (3M)
- f) What are the different configurations of feedback amplifier? (2M)

**PART -B**

2. a) State and explain the law of mass action. (7M)
- b) State and derive continuity equation. (7M)
3. a) Discuss Zener breakdown mechanism and how it differs from Avalanche breakdown. (7M)
- b) Explain the working principle of P/N diode. (7M)
4. a) With circuit and necessary waveforms explain the operation of Bridge rectifier and derive ripple factor, conversion efficiency. (7M)
- b) Draw the circuit of a Zener regulator circuit and explain its operation. (7M)
5. a) Sketch the output characteristics of CE configuration for different values of input current and mention various regions of operation. From these characteristics, obtain  $I_B$  Vs  $I_C$  characteristic for fixed  $V_{CE}$ . (7M)
- b) For a certain BJT  $I_{CBO} = 0.1\mu A$ ,  $I_{CEO} = 16\mu A$  Calculate  $\alpha$  and  $\beta$  (7M)  
 For a given BJT  $\beta = 100$ ,  $I_{CBO} = 0.1\mu A$ ,  $I_B = 80\mu A$  Determine  $I_E$ .
6. a) Draw the V- I characteristics of UJT and explain its operation with the help of equivalent circuit. (10M)
- b) Compare the performance of FET with BJT? (4M)
7. a) Explain Wien bridge oscillator and derive its frequency of oscillation. (8M)
- b) Discuss the concept of Barkhausen criterion and derive the conditions of oscillators. (6M)

**II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019**  
**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**
- ~~~~~

**PART -A**

1. a) Define mass action Law. (3M)
- b) What are the applications of Varactor diode (2M)
- c) Define TUF of a rectifier. (2M)
- d) Draw CC configuration of BJT and its input and output characteristics? (2M)
- e) What is the pinch-off voltage in a JFET? (2M)
- f) What is Barkhausen criteria? (3M)

**PART -B**

2. a) Draw and explain the energy band diagram of intrinsic semi conductor. (6M)
- b) What are drift current and diffusion current in a semiconductor? Explain about them. (8M)
3. a) Discuss how a depletion layer is formed in a P-N diode and how does it vary with biasing? Draw V-I characteristics of P-N junction diode. (4M)
- b) With neat diagram, explain the operation of P/N diode and mention its disadvantages & how do we overcome? (10M)
4. a) Draw the circuit diagram of a Full-wave rectifier and derive expressions for  $I_{dc}$ ,  $I_{rms}$ ,  $P_{ac}$ ,  $\eta$ . Sketch the relevant input and output wave forms. (10M)
- b) Give the advantages and disadvantages of HWR and FWR. (4M)
5. a) Compare CB, CC, CE configuration of a Bipolar transistor with respect to the current gain, voltage gain, input resistance and output resistance. (8M)
- b) Describe how  $h_{ie}$  and  $h_{fe}$  can be determined from BJT characteristics. (6M)
6. a) Explain the principle of operation of n type of MOSFET. Draw its  $I_d/v_{ds}$  characteristics. (7M)
- b) With neat sketch explain the low frequency model of JFET and derive different parameters. (7M)
7. a) Explain how negative feedback acts on bandwidth, distortion, Input Impedance and Output Impedance of a circuit. (7M)
- b) Draw the circuit diagram of class-B Push pull amplifier and explain the operation. Derive its conversion efficiency. (7M)

**II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2019**  
**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**

**PART -A**

1. a) Compare Extrinsic and Intrinsic Semi-Conductors. (2M)
- b) Draw the V-I characteristics of an ideal diode. (2M)
- c) Define rectifier. Mention the types. (2M)
- d) Why CE configuration is most popular in amplifier circuits? (2M)
- e) Why FETs are voltage controlled devices and mention its advantages over BJT. (3M)
- f) What are the general characteristics of negative feedback amplifiers? (3M)

**PART -B**

2. a) What is meant by Hall-effect? Derive the expression for Hall voltage. (7M)
- b) Give the relationship between drift and diffusion current constants. (7M)
3. a) What is diffusion capacitance in PN junction diode? Derive its equation. (6M)
- b) Explain the working principle of (8M)
  - (i) Photo diode
  - (ii) Varactor diode
4. a) Explain the operation of a shunt voltage regulator with suitable diagrams. (8M)
- b) Draw the circuit of a simple Zener regulator and determine the component values (6M)  
 for the given data.  $V_{BB} = 30V$ ,  $V_Z = 12V$ ,  $I_L = 180ma$ ,  $I_Z = 20ma$ .
5. a) Mention and discuss different stabilization techniques in detail? (10M)
- b) What is thermal runaway? Explain a remedy for it. (4M)
6. a) Explain how FET acts as an amplifier. (4M)
- b) Draw the Drain characteristics of N-Channel MOSFET for different values of  $V_{GS}$  to operate either in enhancement mode or as the depletion mode. From these characteristics obtain transfer curve for a fixed  $V_{DS}$  and indicate enhancement & depletion region. Derive  $I_d$  for all 3 regions of operation. (10M)
7. a) Draw the circuit of class -A transformer fed power amplifier and derive the expression for output power  $P_o$ . (8M)
- b) The gain of an amplifier is decreased to 1000 with negative feedback from its gain of 5000. Calculate the feedback factor and the amount of negative feedback in dB. (6M)