Code No: RT21023 **R13** SET - 1

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
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. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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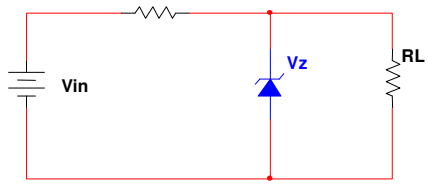
PART –A

1. a) What are meant by N-type impurity in semiconductor? (3M)
   b) List the application of photodiode (4M)
   c) what are the advantages of bridge rectifier (4M)
   d) Derive the relationship between α and β (4M)
   e) Write the difference between BJT and JFET (3M)
   f) Define feedback amplifier? How it classify (4M)

PART -B

2. a) Explain Hall Effect. How can Hall Effect be used to determine some of the properties of semiconductor? (8M)
   b) Prove that the conductivity of a semiconductor is given by, $\sigma = q(P\mu_p + n\mu_n)$. (8M)

3. a) Determine the range of input voltage that maintains the output voltage of 10V, for the regulator circuit shown (8M)



   b) Explain characteristics of tunnel diode with the help of energy band diagrams (8M)

4. a) derive expressions for rectification efficiency, ripple factor, transformer utilization factor, form factor, peak factor of a half-wave rectifier with resistive load (8M)
   b) A full wave rectifier supplies a load requiring 300V at 200mA. Calculate the transformer secondary voltage for (8M)
   (i) a capacitor input filter using a capacitor of 10mF, and (ii) a choke input filter using of 10H and a capacitor of 10μF.Neglect the resistance of choke

5. a) Explain how transistor is used as an amplifier (8M)
   b) Consider the self-bias circuit where V_{cc}=22.5V, R_c=5.6 kΩ, R2=10 kΩ and R1= 90 kΩ,h_{fe}=55,V_{BE}=0.6V.the transistor operates in active region. Determine (8M)
   (i) operating point (ii) stability factor

6. a) Explain principle of operation and characteristics of power IGBT (8M)
   b) Explain low frequency model of JFET (8M)

7. a) Why do need three RC networks for a phase shift oscillations? Can it be two or four? (6M)
   b) Draw the circuit diagram Push-full amplifiers and explain in detail (10M)

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Code No: RT21023 **R13** SET - 2

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) What are meant by P-type impurity in semiconductor? (3M)
   b) List the application of LED (3M)
   c) compare full-wave rectifier and bridge rectifier (4M)
   d) What is Thermal runway? How can it be avoid? (4M)
   e) Write the difference between JFET and MOSFET (4M)
   f) Write the application of power amplifier (4M)

PART -B

2. a) State and explain Mass-action Law (8M)
   b) Compute the conductivity of a silicon semiconductor which is doped with acceptor impurity to a density of 10^{22} atoms/m^3. Given that $n_i = 1.4\times10^{16}/m^3$, $\mu_n = 0.145\,m^2/V-s$ and $\mu_p = 0.05\,m^2/V-s$. (8M)

3. a) Explain V-I characteristics of a PN junction diode (8M)
   b) Design a zener regulator for the following specifications: output voltage ,V_0=5V, load current,I_L =20mA,input voltage , V_i= 12V $\pm$ 3V, zener wattage ,P_z=500mW (8M)

4. a) Derive expressions for rectification efficiency, ripple factor, transformer utilization factor, form factor, peak factor of a full-wave rectifier with resistive load (8M)
   b) compare the performance of inductive, L-section and π-section filters (8M)

5. a) Explain how transistor is used as an switch (8M)
   b) Derive an expression for the stability factor of a CB bias circuit (8M)

6. a) Explain principle of operation and characteristics of SCR (8M)
   b) Explain how JFET as an amplifier (8M)

7. a) Explain the operation of wein-bridge oscillator with the help of neat circuit diagram. How is amplitude stability achieved in this circuit? (8M)
   b) Explain the operation Class C power amplifier with neat circuit diagram and its efficiency (8M)

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Code No: RT21023 **R13** SET - 3

II B. Tech I Semester Regular/Supplementary Examinations, Oct/Nov - 2016
BASIC ELECTRONICS AND DEVICES
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Time: 3 hours Max. Marks: 70

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

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PART –A

1. a) Write the difference between intrinsic and extrinsic semiconductors (3M)
   b) Explain the formation of depletion region in a PN junction (4M)
   c) What is the need for filters in power supplies? (4M)
   d) What is the need for biasing a transistor? (3M)
   e) Write the application of JFET (4M)
   f) Write the Condition for oscillations (4M)

PART –B

2. a) Derive the conductivity equation for an N-type and P-type semiconductor (8M)
   b) The mobility of electrons and holes in a sample of intrinsic germanium at room temperature are 0.36 m^2/V-s and 0.17 m^2/V-s, respectively. If the electron and hole densities are each equal to $2.5\times10^{19}/m^3$, calculate the conductivity (8M)

3. a) Explain about Avalanche break down in detail (8M)
   b) In a Zener regulator, the D.C input is $10V \pm 20\%$,the output requirement are 5V, 20mA, Assume $I_{z(min)}$) and $I_{z(max)}$ as 5mA and 80mA respectively. Design the zener regulator (8M)

4. a) draw the circuit diagram of full-wave rectifier and explain its operation (8M)
   b) A bridge rectifier with capacitor filter is fed from 220V to 40V step-down transformer. If average d.c current is load is 1A and capacitor filter of 800μF, calculate the load regulation and ripple factor, assume power line frequency of 50Hz.neglect diode forward resistance and d.c resistance of secondary of transformer (8M)

5. a) Determine the h-parameters from the characteristics of CB configuration (8M)
   b) Explain about Bias Compensation in transistor (8M)

6. a) Explain principle of operation and characteristics of thyristor (8M)
   b) Explain about enhancement and depletion mode of MOSFET (8M)

7. a) Draw the circuit diagram of RC phase shift oscillator .drive of expression for frequency of oscillations (8M)
   b) Explain the operation Class A power amplifier with neat circuit diagram (8M)

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Code No: RT21023 **R13** SET - 4

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2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Define the terms conductivity and mobility in semiconductor (3M)
   b) Write the application of PN junction diode (4M)
   c) Compare half-wave and full-wave rectifier (4M)
   d) What is relation between I_B, I_E and I_C in CB configuration? (4M)
   e) What is MOSFET? How many types of MOSFETs are their? (4M)
   f) Write the difference between the positive feedback and negative feedback amplifier (3M)

PART -B

2. a) Describe applications of Hall effect (8M)
   b) A crystal of pure germanium has sufficient antimony added to produce 1.5×10^{22} antimony atom/m^3.the electron and hole mobility are $0.38 m^2$/V-s and $0.18 m^2$/V-s respectively, and the intrinsic charge density is $2.5 \times 10^{19}/m^3$. Calculate (i) the density of electrons and holes in crystal, and (ii) the conductivity. (8M)

3. a) Explain about Zener break down in detail (8M)
   b) Design a zener regulator for the following specifications: output voltage ,V_0=5V, load current,I_L =20mA,input voltage , $V_i = 12V \pm 3V$, zener wattage ,P_z=500mW (8M)

4. a) A full-wave rectified voltage of 18V peak is applied across a 500μF filter capacitor. Calculate the ripple and d.c voltages if the load takes a current of 100mA (8M)
   b) Determine the ripple factor of an L-type choke input filter comparing a 10H choke and 8μF capacitor used with an full-wave rectifier. Compare with a simple 8μF capacitor input filter at a load current of 50mA and also at 150mA. Assume the d.c voltage of 50V (8M)

5. a) Determine the h-parameters from the characteristics of CE configuration (8M)
   b) An NPN transistor if β=50 is used in common emitter circuit with V_{cc} =10V and R_c=2kΩ. the bias is obtained by connecting 100kΩ resistor from collector to base. Find the quiescent point and stability factor (8M)

6. a) Explain principle of operation and characteristics of power MOSFET (8M)
   b) Explain about JFET Characteristics (8M)

7. a) Draw the circuit diagram of Crystal oscillator .drive of expression for frequency of oscillations (8M)
   b) Find the efficiency of class A and class B of power amplifiers (8M)

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