

**KADI SARVA VISHWAVIDHYALAYA**

**BE 3<sup>rd</sup> SEMESTER (EE)**

**End Semester Examination (Dec-2016)**

**Subject Code: EE-305**

**Date: 28/ 12/2016 (Wednesday)**

**Subject Name: - ELECTRONICS DEVICES & CIRCUITS**

**Time: 10:30 AM to 1:30 PM**

**Total Marks: 70**

**Instructions:**

1. Answer each section in good handwriting in separate answer sheet.
2. All questions are compulsory.
3. Use of scientific calculator is permitted.
4. Indicate clearly the options you attempt, along with its respective question number.

**SECTION -I**

**Q-1 [A] Explain forward bias and reverse bias of a diode with proper circuit diagram. Draw the V-I characteristics for the diode. [05]**

**[B] Explain energy band gap for metals, insulators and semiconductors. [05]**

**[C] Explain half wave rectifier circuit with proper circuit diagram and waveforms. [05]**

**OR**

**[C] What do you mean by doping of semiconductor materials? [05]**

**Q-2 [A] Explain p-type and n-type semiconductor materials with suitable examples. [05]**

**[B] Write a short note on Zener diode. [05]**

**OR**

**Q-2 [A] Explain full wave bridge rectifier circuit with proper circuit diagram and wave forms. [05]**

**[B] Discuss in brief the working of LED. Draw its symbol. [05]**

**Q-3 [A] Which of the transistor currents is always the largest? Which is always the smallest? Which two currents are relatively close in magnitude? [05]**

**[B] Explain working of BJT with proper circuit diagrams. [05]**

**OR**

**Q-3 [A] Explain the relation between common base current gain  $\alpha$  and common emitter current gain  $\beta$ . [05]**

**[B] Explain operation of NPN transistor in common emitter configuration with proper circuit diagram and input and output characteristics. [05]**

## SECTION -II

- Q-4** [A] Explain fixed bias configuration in brief. Use proper equations. [05]  
[B] Why the channel of a JFET is curved? i.e. more narrow at drain than at source end. Explain in brief. [05]  
[C] Draw construction and V-I characteristics of N-channel JFET. [05]
- OR**
- [C] Explain majority and minority charge carriers. [05]

- Q-5** [A] Differentiate between BJT and JFET. [05]  
[B] Explain intrinsic and extrinsic type semiconductor materials. [05]
- OR**
- Q-5** [A] Sketch the basic construction of an n-channel enhancement-type MOSFET. Also draw its symbol and transfer curve and V-I characteristics. [05]  
[B] What is the major difference between a bipolar and a unipolar device? Give an example for each. [05]

- Q-6** [A] What is full form of MOSFET? What is significance of  $\text{SiO}_2$  in MOSFET? [05]  
[B] Sketch the basic construction of an n-channel depletion -type MOSFET. Also draw its symbol. [05]
- OR**
- Q-6** [A] Explain series fed class A amplifier with proper circuit diagram. [05]  
[B] Explain in brief the Miller effect capacitance. [05]

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----- *Have patience, Think hard, write neatly and clearly-----  
Best of Luck* -----

# KADI SARVA VISHWAVIDYALAYA

## B.E. SEMESTER III THEORY EXAMINATION (November 2015)

SUBJECT CODE: EE-305 SUBJECT NAME: ELECTRONICS DEVICES AND CIRCUITS

DATE: 07/12/2015

TIME: 10:30 a.m. to 1:30 p.m.

TOTAL MARKS: 70

### Instructions:

1. Answer each section in separate Answer sheet.
2. Use of Scientific Calculator is permitted.
3. All questions are compulsory.
4. Indicate clearly, the options you attempted along with its respective question number.
5. Use the last page of main supplementary for rough work.

### Section 1

**Q:1 (All Compulsory)**

- (A) Write short note on LED. 5  
(B) Explain Construction and operation of BJT. 5  
(C) What do you mean by semiconductor materials? Explain its atomic structure. 5

OR

- (C) Discuss the relationship between JFET and BJT. 5

**Q:2 Answer the following Questions**

- (A) Draw and Explain Construction and operation of p-channel depletion type MOSFET. 5  
(B) Discuss in brief on Storage capacitance and Diffusion capacitance. 5

OR

- (A) Describe the construction, the symbol and V-I characteristics of Zener Diode. 5  
(B) Explain any practical application of transistor. 5

**Q:3 Answer the following Questions**

- (A) Draw and Explain the Characteristics of common-Collector Configuration. 5  
(B) Write short note on power amplifier. Draw the circuit for series fed class A amplifier. 5

OR

- (A) Draw and Explain the Characteristics of common-base Configuration. 5  
(B) Explain Zener breakdown and Avalanche breakdown. 5

## Section 2

**Q:4 (All Compulsory)**

- (A) Draw and Explain Construction and Characteristics of JFET. 5  
(B) Explain Miller effect capacitance. 5  
(C) Write a short note on Diode. Draw the circuit and V-I characteristics for Forward bias & Reverse bias. 5

OR

- (C) Explain  $r_e$  transistor model of common-emitter fixed bias configuration. 5

**Q:5 Answer the following Questions**

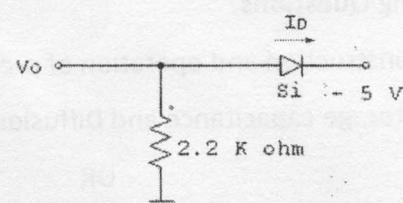
- (A) Explain Fixed bias Configuration. 5  
(B) Draw and Explain Full wave rectifier with neat waveforms. 5

OR

- (A) Explain Voltage Divider bias circuit 5  
(B) Draw the circuit to implement AND, OR and NOT Gate using diode. Explain the circuit and Draw the respective truth table. 5

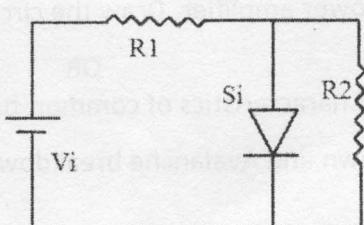
**Q:6 Answer the following Questions**

- (A) Explain Class B Amplifier Push-Pull Circuits. 5  
(B) Determine  $V_o$  and  $I_d$  for the network shown in the following figure, consider cut in voltage = 0.7 V for silicon diode. 5



OR

- (A) Classify and explain different clipper circuits. 5  
(B) Calculate the voltage drop across the resistors R1 and R2 in the following figure. Given that  $V_i = 12$  V,  $R_1 = 5 \Omega$ ,  $R_2 = 5 \Omega$ . 5



# KADI SARVA VISHWAVIDHYALAYA

## B.E. Semester III

Subject Code:- EE-305

Subject Name:- Electronic Devices& Circuits

Date:- 28/11/2013

Time:- 10:00 a.m TO 1:00 p.m

Total Marks-70

### Instructions:

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. All the questions are **compulsory**.
4. Indicate **clearly**, the options you attempt along with its respective question number.
5. Use the last page of main supplementary for **rough work**.

### Section-I

#### Q-1. Answer the following questions.

- (A) Draw complete V-I characteristic of the diode. Explain effect of temperature on V-I characteristic of the diode with neat diagram. [5]
- (B) Draw the symbol of LED and explain principle of operation. List its applications. [5]
- (C) What do you mean by rectifier? Explain working of full-wave bridge rectifier with necessary waveforms. [5]

**OR**

- (C) Explain DC Bias operation for series-fed class A amplifier with necessary circuit diagram and equations. [5]

#### Q-2. Answer the following questions.

- (A) Explain current components in a transistor. [5]
- (B) A germanium transistor with  $\alpha = 0.98$  gives a reverse saturation current  $I_{CBO}=10\mu A$  in common base configuration. When transistor is used in CE configuration with a base current of  $0.22 \mu A$ , calculate the collector current. [5]

**OR**

- (A) Sketch the cross section and explain the construction of P-channel enhancement type MOSFET. [5]
- (B) Draw the static drain characteristic and transfer characteristic curves for N channel enhancement type MOSFET. [5]

#### Q-3) Answer the following questions.

- (A) Classify and explain different Clipper circuits. [5]
- (B) What is biasing? Why is biasing required for transistor? [5]

OR

- (A) Explain the purpose of bode plot using suitable example. [5]  
 (B) Explain Miller Effect Capacitance. [5]

## Section -II

### **Q-4. Answer the following questions.**

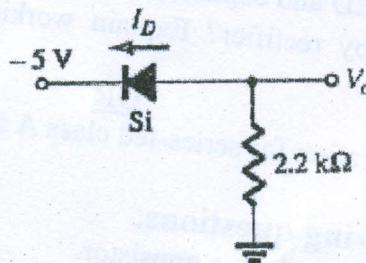
- (A) Derive  $r_e$  transistor model for Common-Emitter configuration. [5]  
 (B) Explain AC analysis of Common-emitter Fixed-bias Configuration using  $r_e$  equivalent model. [5]  
 (C) Explain voltage divider bias circuit. [5]

OR

- (C) What are harmonics? Explain Harmonic Distortion in amplifier. [5]

### **Q-5. Answer the following questions.**

- (A) Draw the symbol and explain principle of operation of varactor diode. [5]  
 (B) Determine  $V_o$  and  $I_o$  for the network shown in the following fig. Consider cut in voltage = 0.7 V for silicon diode. [5]



OR

- (A) Explain square wave testing method of amplifier with necessary diagrams. [5]  
 (B) Explain class C amplifiers with necessary diagrams. [5]

### **Q-6. Answer the following questions.**

- (A) Explain Common base configuration of transistor with its characteristics. Clearly indicate cut off, active and saturation region. [5]  
 (B) Explain Darlington connection and Feedback pair. [5]

OR

- (A) List practical applications of transistor and explain any one in detail. [5]  
 (B) Explain Zener breakdown and Avalanche breakdown. [5]

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

# KADI SARVA VISHWAVIDHYALAYA

## B.E. Semester III

**Subject Code:- EE-305**

**Subject Name:- Electronic Devices & Circuits**

**Date:- 28/04/2014**

**Time:- 10:30 a.m TO 1:30 p.m**

**Total Marks - 70**

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### Instructions:

1. Answer **each section** in separate answer sheet.
  2. Use of scientific calculator is **permitted**.
  3. All the questions are **compulsory**.
  4. Indicate **clearly**, the options you attempt along with its respective question number.
  5. Use the last page of main supplementary for rough work.
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### Section-I

#### **Q-1. Answer the following questions.**

- (A) Explain intrinsic and extrinsic materials. Explain n-type and p-type materials. [5]  
(B) Explain operation of diode in no bias, forward bias and reverse bias condition using V-I characteristic. [5]  
(C) Explain working of half-wave bridge rectifier with necessary waveforms. [5]

**OR**

- (C) Explain Phase-splitter circuits. [5]

#### **Q-2 Answer the following questions.**

- (A) Explain transistor operation for PNP and NPN transistor. [5]  
(B) Explain common-emitter configuration of transistor with its characteristics. [5]

**OR**

- (A) Explain MOSFET as an Amplifier. [5]  
(B) Explain MOSFET as a switch. [5]

#### **Q-3 Answer the following questions.**

- (A) Explain practical applications of transistor. [5]  
(B) Classify and explain different Clamper circuits. [5]

**OR**

- (A) Explain normalization process with suitable example. [5]  
(B) Explain Gain versus frequency for RC coupled amplifier. [5]

## Section – II

**Q-4. Answer the following questions.**

- (A) Explain Feedback pair and Darlington connection. [5]  
(B) Mention different models used for small-signal analysis and give steps to obtain AC equivalent network. [5]  
(C) Explain common-emitter fixed biased configuration. [5]

**OR**

- (C) Explain Miller Effect Capacitance. [5]

**Q-5 Answer the following questions.**

- (A) Explain Zener breakdown and Avalanche breakdown. [5]  
(B) Explain reverse recovery time of the diode using waveforms. [5]

**OR**

- (A) Explain Harmonic Distortion in amplifier. [5]  
(B) What is amplifier? Discuss different types of amplifiers in brief. [5]

**Q-6 Answer the following questions.**

- (A) Derive  $r_e$  transistor model for common-emitter configuration. [5]  
(B) Explain Common emitter configuration of transistor with its characteristics. [5]

**OR**

- (A) What is biasing? Why is biasing required for transistor? [5]  
(B) Explain effect of temperature on V-I characteristic of the diode. [5]

\*\*\*\*\* ALL THE BEST \*\*\*\*\*

# KADI SARVA VISHVAVIDYALAYA

## B.E. SEMESTER III EXAMINATION (Nov/2014)

SUBJECT CODE: EE- 305 SUBJECT NAME:ELECTRONIC DEVICES & CIRCUITS

DATE:- 10/11/2014

TIME:10:30 to 1:30

TOTAL MARKS:70

### Instructions:

1. Answer each section in separate answer sheets
2. Use of scientific Calculator is permitted
3. All questions are compulsory
4. Indicate clearly the options you attempted along with the respective question number.
5. Use the last page of your supplementary for rough work

### Section – I

#### Q-1

- A Explain limits of operation of a transistor. 5
- B Explain step by step construction and working of PN junction diode with diagrams. 5
- C Explain current components in a transistor. 5

#### OR

- C Explain different models used for small-signal analysis in brief. Explain the steps to obtain AC equivalent network. 5

#### Q-2

##### Answer the following questions

- A Write a brief note on (i) Zener diode (ii) LED 5
- B Determine  $R_C$  and  $R_B$  for a fixed bias configuration if  $V_{CC}=12V$ ,  $\beta=80$  and  $I_{CQ}=2.5 \text{ mA}$  with  $V_{CEQ}=6V$ . 5

#### OR

- A Explain two-port system approach for analysis of different amplifier configurations. 5
- B Derive re transistor model for (1) Common-Emitter configuration (2) Common-Base Configuration 5

#### Q-3

##### Answer the following questions

- A Classify different clipper circuits and explain any two in detail. 5
- B Draw and explain voltage doubler circuit. 5

#### OR

- A Explain series fed class A amplifier with proper circuit diagram and waveforms. 5
- B Explain class B amplifier with proper circuit diagram and waveforms. 5

## Section – II

**Q-4**

- A Explain with diagrams construction and working of N- channel enhancement mode MOSFET. Also draw the characteristic graphs . 5
- B Why depletion region in JFET is curved. i.e. narrow at drain and wide at source. Explain. 5
- C Explain low frequency response analysis of BJT using voltage-divider BJT bias configuration. 5

**OR**

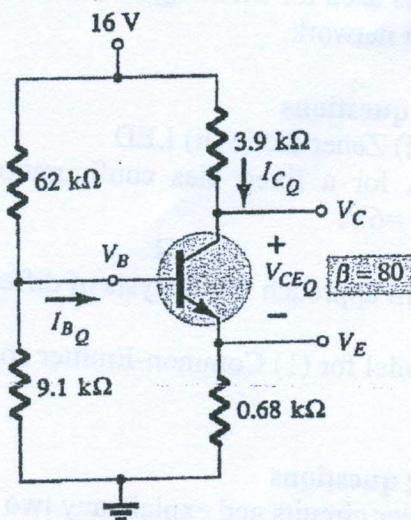
- C Differentiate between BJT and FET. 5

**Q-5 Answer the following questions**

- A What is an amplifier? Discuss different types of amplifiers in brief. 5
  - B Explain Miller Effect Capacitance. 5
- OR**
- A Explain any clamper circuit with proper circuit diagram and input-output waveforms. 5
  - B Explain the following:
    - (i) Why is collector wider than emitter & base?
    - (ii) Why base is made thin?
    - (iii) Why is collector current slightly less than emitter current?

**Q-6 Answer the following questions**

- A For the Voltage-Divider Bias Configuration shown in figure. Determine (a)  $I_{BQ}$  5  
 (b)  $I_{CQ}$  (c)  $V_{CEQ}$  (d)  $V_C$  (e)  $V_E$  (f)  $V_B$



- B Explain fixed bias circuit for transistor DC biasing. 5

**OR**

- A What happens when positive voltage at gate w.r.t. source  $V_{GS}$  is applied in JFET? Explain. 5
- B Explain power handling capacity of transistor and necessity of heat sinking. 5

# KADI SARVA VISHVAVIDYALAYA

## B.E. SEMESTER III EXAMINATION (April/2015)

SUBJECT CODE: EE-305

SUBJECT NAME: Electronics Devices and Circuits

DATE: 17/04/2015

TIME: 10:30 to 1:30

TOTAL MARKS: 70

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Instructions:

1. Answer each section in separate answer sheets
2. Use of scientific Calculator is permitted
3. All questions are compulsory
4. Indicate clearly the options you attempted along with the respective question number.
5. Use the last page of your supplementary for rough work

### Section – I

**Q-1 Answer the following questions**

- A Define following terms: 5  
(i) Electron Volt (eV). (ii) Mobility of charge carries. (iii) Barrier potential.  
(iv) Voltage equivalent of temperature. (v) Reverse recovery time of diode
- B Explain energy band diagram of insulator, semiconductor and conductor 5
- C Explain following for npn transistor. 5  
(i) Current components.  
(ii) Regions of operation according to biasing condition

**OR**

- C Sketch the cross section of a P-channel enhancement MOSFET .Show two circuit symbols for MOSFET 5

**Q-2 Answer the following questions**

- A Explain full wave bridge rectifier with the circuit diagram of and give its input and output waveforms. 5
- B Explain Hall effect. Derive expression of Hall voltage and state its applications. 5
- OR**
- A State the role of voltage regulators in power supplies? Discuss working of a series voltage regulator. 5
- B A bar of n type silicon has length of 5 cm and circular cross sectional area of 10 mm<sup>2</sup>. When it is subjected to a voltage of 1 V along its length, the current flowing through it is 5 mA. Calculate the concentration of free electrons and drift velocity of electrons. Assume mobility of free electrons to be 1300 cm<sup>2</sup>/V-s. 5

**Q-3 Answer the following questions**

- A Compare zener and avalanche break down. 5
- B What is transition capacitance in p-n junction diode? Give its physical significance. 5
- OR**
- A State the use of clipping circuits. Discuss with neat sketch working of a biased parallel clipper. 5
- B Explain principle of operation of a Photodiode. 5

## Section – II

**Q-4 Answer the following questions**

- A Discuss piece-wise linear model of a diode. 5  
B Compare V-I characteristics of Silicon and Germanium p-n junction diode. 5  
C Define: (1) Drift velocity of electron (2) Electric field (3) Photovoltaic potential (4) Photo excitation (5) Photo ionization 5

**OR**

- C Derive relationship between  $\alpha$  dc and  $\beta$  dc of a transistor. 5

**Q-5 Answer the following questions**

- A Draw CE transistor configuration and give its input and output characteristics. 5  
Also derive the relation between current gain of CB configuration  
B Give constructional details of JFET and give its characteristics. Why FET is called voltage controlled device 5

**OR**

- A Explain the operation of Emitter follower amplifier. Why is it named as emitter follower? 5  
B Give points of difference between BJT and FET. 5

**Q-6 Answer the following questions**

- A State the need of biasing. Discuss voltage divider bias circuit and mention its advantages. 5  
B State important features of power amplifier and classify them based on the position of Q point. 5

**OR**

- A Explain FET as voltage variable resistor. 5  
B Discuss h-parameter equivalent circuit for transistor in CE configuration. 5

\*\*\*\*\***ALL THE BEST**\*\*\*\*\*