Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 27184

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2015.

Second Semester

Electronics and Communication Engineering

EC 6201 — ELECTRONIC DEVICES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the applications of PN diode?

2. Consider a gallium arsenide sample at T = 300 K wit doping concentration of N_a = 0, $N_d = 10^{16}\,\text{cm}^{-3}$ and μ_n = 8500. Calculate the drift current density if the applied electric field is E = 10 V/cm.

3. What is multiple emitter transistor? Draw the symbol of that.

4. Define Early effect in BJT.

5. Assume that the p^+n junction of a uniformly doped silicon n – channel JFET at T = 300 K has doping concentration of $N_a = 10^{18}\,\text{cm}^{-3}$ and $N_d = 10^{16}\,\text{cm}^{-3}$. Assume that the metallurgical channel thickness is 0.75 μn. Calculate the pinch off voltage.

6. Draw the symbol of FINFET and Dual gate MOSFET.

7. Mention the applications of Varactor diode.

8. What is the basic principle behind the LDR?

9. What is the name implies VMOS?

10. Draw the circuit diagram of opto coupler.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Briefly explain about depletion region and barrier voltage of a PN junction. (6)

(ii) With necessary diagram, describe the characteristics of a forward and reverse biased PN junction diode. (10)

Or

(b) (i) Draw a diagram to illustrate drift current and diffusion current in a semiconductor material. Briefly explain. (10)

(ii) Write short notes on diode switching characteristics. (6)

12. (a) Draw the circuit diagram of an NPN junction transistor CB configuration and describe the static input and output characteristics. Also define active, saturation and cut-off regions. (16)

Or

(b) (i) Draw the *h* parameter equivalent circuit for NPN transistor CE circuit. Define and derive for all components. (12)

(ii) Compare CB, CE and CC with respect to dc and ac parameters. (4)

13. (a) With neat diagram explains the construction, working principle and V-I characteristics of *p* channel JFET. (16)

Or

(b) With neat diagram explain the operation of Depletion mode MOSFET and sketch the characteristics curves. (16)

14. (a) (i) Sketch the basic construction and characteristics for a Scottky diode. Briefly explain the device operation. (8)

(ii) With neat diagram explain the operation of Zener diode and its characteristics. (8)

Or

(b) (i) What is the difference between the Tunnel diode and ordinary PN diode? (2)

(ii) Explain the operation of Tunnel diode and its characteristics with structural diagram. (14)

15. (a) (i) Explain how a UJT functions as Relaxation Oscillator. (8)

(ii) Explain the operation of SCR with structural diagram and Draw the characteristics for a SCR. (8)

Or

(b) Write short notes on :

(i) Liquid Crystal Display. (8)

(ii) Charge Coupled Device. (8)

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Question Paper Code : 57276

B.E/B.Tech. DEGREE EXAMINATION, MAY/JUNE 2016

Second Semester

Electronics and Communication Engineering

EC 6201 – ELECTRONIC DEVICES

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What is meant by diffusion current ?
2. Define storage time.
3. A transistor has $\beta = 150$, find the collector and base current, if $I_E = 10$ mA.
4. What is meant by base width modulation ?
5. Compare MOSFET & FET.
6. Give some applications of JFET.
7. Mention some advantages and disadvantages of Tunnel Diode.
8. Draw the energy band diagram of Metal Semi conductor junction after contact is made.
9. What is meant by regenerative action of SCR ?
10. Mention some advantages and disadvantages of LCD.

PART – B (5 × 16 = 80 Marks)

11. (a) The diode current is 0.6 mA when the applied voltage is 400 mV and 20 mA when the applied voltage is 500 mV. Determine η. Assume $\frac{kT}{q} = 25$ mV. **(16)**

OR

(b) (i) Describe the action of PN junction diode under forward bias and reverse bias condition. **(10)**

(ii) The reverse saturation of a silicon PN junction diode is 10 μA. Calculate the diode current for the forward bias voltage of 0.6 V at 25 °C. **(6)**

12. (a) Draw the CE configuration of NPN transistor, and explain its input output characteristics with suitable diagrams. **(16)**

OR

(b) (i) The reverse leakage current of the transistor when connected in CB configuration is 0.2 mA and it is 18 μA when same transistor is connected in CE configuration. Calculate α_{dc} & β_{dc} of the transistor. (Assume $I_B = 30$ mA) **(12)**

(ii) Distinguish between h-parameter and hybrid π model. **(4)**

13. (a) Derive an expression for drain current of FET in Pinch off region with necessary diagram. **(16)**

OR

(b) (i) Explain the construction and principle of operation of depletion MOSFET with suitable diagram. **(10)**

(ii) Write short notes on Dual gate MOSFET. **(6)**

14. (a) What is meant by tunnelling ? Explain the V-I characteristics of a tunnel diode using energy band diagram. **(16)**

OR

(b) Briefly describe about the operation of

(i) Varactor Diode **(8)**

(ii) Laser Diode **(8)**

15. (a) Draw the basic structure of UJT and explain V-I characteristics of UJT using equivalent circuit. **(16)**

OR

(b) Draw the V-I characteristics of

(i) DIAC **(8)**

(ii) TRIAC **(8)**

and explain its operation.

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Question Paper Code : 71722

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Second Semester

Electronics and Communication Engineering

EC 6201 — ELECTRONIC DEVICES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the voltage at which the reverse current in a germanium PN junction diode attains a value of 90% of its saturation value at room temperature.

2. What is meant by peak inverse voltage?

3. Define early effect.

4. If a transistor has a α of 0.97, find the value of β.

5. Compare FET and BJT.

6. Give the current voltage relationship of the D- MOSFET and E-MOSFET.

7. Mention few applications of varactor diode.

8. Define Gunn effect.

9. Draw the basic structure of DIAC and its symbol.

10. Define holding current.

PART B — (5 × 16 = 80 marks)

11. (a) Derive an expression for PN junction diode forward and reverse currents with suitable diagram and necessary explanation. (16)

Or

(b) Discuss about the switching characteristics of PN junction diode with suitable diagrams. (16)

12. (a) (i) Draw the Eber's Moll model for a PNP transistor and explain its significance. (8)

(ii) What is known as current amplification factor? Derive the relationship between the amplification factor of CE, CB and CC configuration. (8)

Or

(b) (i) A transistor with $I_B = 100\mu A$, and $I_C = 2\ mA$ find

(1) β of the transistor

(2) α of the transistor

(3) emitter current I_E

(4) if I_B changes by $25\mu A$ and I_C changes by 0.6 mA. Find the new value of β. (10)

(ii) Justify transistor as an amplifier. (6)

13. (a) (i) What is known as metal oxide semiconductor field effect transistor? Explain its principles of operation in enhancement mode with suitable diagram. (10)

(ii) Discuss the effect of channel length modulation. (6)

Or

(b) Explain the construction and operation of N-Channel JFET with suitable diagram. (16)

14. (a) Draw the V-I characteristics of zener diode and explain its operation and also brief how it can be used as a regulator. (16)

Or

(b) Draw the V-I characteristics of Schottky diode and explain its operation. (16)

15. (a) Draw the transistor model of an SCR and describe the working principle of an SCR with V-I characteristics. (16)

Or

(b) Write short notes on :

(i) Opto coupler. (8)

(ii) LCD. (8)

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Question Paper Code : 77109

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Second Semester

Electronics and Communication Engineering

EC 6201 — ELECTRONIC DEVICES

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Consider a silicon pn junction at T = 300 K so that $n_i = 1.5 \times 10^{10}$ cm^{-3}. The n type doping is 1×10^{16} cm^{-3} and a forward bias of 0.60 V is applied to the pn junction. Calculate the minority hole concentration at the edge of the space charge region.

2. Sketch the forward bias characteristics of the pn junction diode.

3. What do you mean by drift current?

4. Sketch the Ebers Moll model.

5. Assume that the p+n junction of a uniformly doped silicon n channel JFET at $T = 300$ K has doping concentrations of $N_a = 10^{18}$ cm^{-3} and $N_d = 10^{16}$ cm^{-3}. Assume that the metallurgical channel thickness a is 0.7 μm. Calculate the pinch off voltage.

6. What is channel length modulation?

7. What is a MESFET?

8. Expand: LASER, LDR.

9. Sketch the V-I characteristics of an UJT.

10. "A solar cell is a pn junction device with no voltage directly applied across the junction". If it is so, how does a solar cell deliver power to a load?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive the expression for drift current density. (12)

(ii) Determine the ideal reverse saturation current density in a silicon pn junction at T = 300 K. Consider the following parameters in the silicon pn junction: $N_a = N_d = 10^{16}$ cm^{-3}, $n_i = 1.5 \times 10^{10}$ cm^{-3}, $D_n = 25$ cm^2/s, $T_{p_0} = T_{n_0} = 5 \times 10^{-7}$ s, $D_p = 10$ cm^2/s, $\in_r = 11.7$. Comment on the result. (4)

Or

(b) (i) Derive the expression for diffusion current density. (12)

(ii) Describe the deviation of V-I characteristics of pn junction diode from its ideal. (4)

12. (a) (i) With relevant expressions and figures, describe Early effect. (6)

(ii) Discuss the Input and Output characteristics of CE configuration. (10)

Or

(b) (i) With relevant expressions and sketch, describe h-parameter model. (6)

(ii) Describe the working of PNP junctions. (10)

13. (a) (i) Discuss the Drain and Transfer characteristics of JFETs. (10)

(ii) Explain the concept of Threshold voltage in a MOSFET. (6)

Or

(b) (i) Discuss the characteristics of MOSFET. (10)

(ii) Describe the concept of dual gate MOSFET. (6)

14. (a) (i) Consider an n-channel GaAs MESFET at T = 300 K with a gold Schottky barrier contact. Assume the barrier height is $\Phi_{B_n} = 0.89$ V. The n-channel doping is $N_d = 2 \times 10^{15}$ cm^{-3}. Determine the channel thickness such that $V_T = +0.25$ V. Also $N_c = 4.7 \times 10^{17}$ cm^{-3} and $\in_r$ of GaAs = 13.1. (4)

(ii) Describe the working of metal-semiconductor junction. (12)

Or

(b) Write short notes on :

(i) Tunnel diode

(ii) Varactor diode

15. (a) Write short notes on :

(i) Power BJT

(ii) Power MOSFET

Or

(b) Write short notes on :

(i) LCD

(ii) CCD

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Question Paper Code : 80330

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Second Semester

Electronics and Communication Engineering

EC 6201 — ELECTRONIC DEVICES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is barrier potential?
2. Define Mass - action law.
3. What is tunneling phenomenon?
4. Compare between schottky diode and conventional diode.
5. Give the symbol, structure and equivalent circuit of DIAC.
6. Compare SCR with TRIAC.
7. What is recovery time? Give its types.
8. What is a metal semiconductor contact?
9. Draw the common base configuration.
10. What is JFET and give its different modes of operation?

PART B — (5 × 16 = 80 marks)

11. (a) Derive the current equation of PN Junction Diode. (16)

Or

(b) Describe construction of PN junction diode. Explain the forward and reverse characteristic of PN junction diode and obtain its VI characteristic curve. (16)

12. (a) (i) With neat diagram explain about input and output characteristics of common emitter configuration. (8)

(ii) Derive the h parameters for the CE. (8)

Or

(b) (i) Derive the expression of Gummel Poon model with a neat circuit diagram. (8)

(ii) Explain input and output characteristics of CB configuration. (8)

13. (a) Describe the working and characteristics of MOSFET, D MOSFET and E MOSFET.

Or

(b) (i) Write short notes on FINFET. (8)

(ii) Explain drain and transfer characteristic of JFET. (8)

14. (a) (i) Explain the construction and volt ampere characteristics of tunnel diode. (8)

(ii) Explain the working and characteristics of laser diode. (8)

Or

(b) (i) Explain V-I characteristics of Zener diode. (8)

(ii) Describe the VI characteristics of LDR. (8)

15. (a) (i) Explain the operation and volt ampere characteristics of SCR. (8)

(ii) Describe the working of photo transistor. (8)

Or

(b) (i) Explain the construction and operation of LCD. (10)

(ii) Explain the working and characteristics of DMOS. (6)

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Question Paper Code : 97223

B.E./B.Tech. DEGREE EXAMINATION, DECEMBER 2015/JANUARY 2016.

Second Semester

Electronics and Communication Engineering

EC 6201 — ELECTRONIC DEVICES

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by doping in a semiconductor?
2. Define drift and diffusion current.
3. What is meant by thermal runaway?
4. The common-base d.c. current gain of a transistor is 0.967. If the emitter current is 10mA, what is the value of base current?
5. Compare JFET with BJT.
6. Define the pinch-off voltage.
7. Explain Zener breakdown.
8. What is tunnelling?
9. What is the advantage of TRIAC over SCR?
10. What is the principle of operation of LCD?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Describe the action of PN junction diode under forward bias and reverse bias. (10)

(ii) Explain the switching characteristics of diode. (6)

Or

(b) (i) Explain and derive the diode current equation. (12)

(ii) Explain how a barrier potential is developed at the PN junction. (4)

12. (a) (i) Explain NPN transistor common-emitter configuration and draw a circuit for determining its input and output characteristics. (10)

(ii) Define α, β and λ of a transistor. Show how are they related to each other. (6)

Or

(b) (i) Briefly explain CE transistor hybrid-π model. (8)

(ii) Draw the Ebers-Moll model for NPN transistor and give the equation for emitter and collector current. (8)

13. (a) (i) With the help of neat sketches and characteristics curves explain the operation of the junction FET. (8)

(ii) Define and explain the parameters transconductance g_m, drain resistance r_d and, amplification factor μ of a JFET. Establish the relation between them. (8)

Or

(b) (i) With the help of a suitable diagram explain the working of E-MOSFET and D-MOSFET. (12)

(ii) What is channel length modulation in MOSFET? (4)

14. (a) (i) Draw the structure of a metal-semiconductor junction and explain the energy band structure before and after contact. (8)

(ii) Explain the principle behind the laser diode with a neat sketch. (8)

Or

(b) (i) What is Schottky diode? Explain the flow of carriers across its junction during forward and reverse biased conditions with energy band diagrams. (8)

(ii) Explain the principle behind the varactor diode and list out its applications. (8)

15. (a) (i) Draw the V-I characteristics of a UJT and explain its working principle. (8)

(ii) Draw the two transistor model of an SCR and explain its breakdown operation. (8)

Or

(b) (i) Explain the operation of a DMOS and VMOS transistor. (8)

(ii) Describe the operation of LED and CCD and list out its applications. (8)

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