

First/Second Semester BE Degree Examination July 2019
(CBCS Scheme)

Time: 3 Hours

Max Marks: 100 marks

Sub: Basic Electronics

Q P Code: 60008/60017

- Instructions:** 1. Answer five full questions.
2. Choose one full question from each module.
3. Your answer should be specific to the questions asked.
4. write the same question numbers as they appear in this question paper.
5. Write Legibly

Module – 1

- 1 a Illustrate with diagram, the functioning of PN junction diode under forward and reverse bias conditions. 6 marks
b With a circuit diagram and waveforms, explain the working of half-wave rectifier and show that power conversion efficiency is 0.405 8 marks
c Explain briefly the operation of a capacitor filter circuit. 6 marks

Or

- 2 a Illustrate the phenomenon of light emission in PN junction. List out any two applications of LED. 6 marks
b With the functional block diagram explain photo coupler. 6 marks
c Illustrate with a diagram, how Zener diode operates as a voltage regulator with and without load. 8 marks

Module – 2

- 3 a Demonstrate the operation of n-channel JFET. 8 marks
b Explain Depletion MOSFET and Enhancement MOSFET characteristics. 6 marks
c With a diagram explain VI characteristics of SCR. 6 marks

Or

- 4 a Explain the operation of p-channel JFET. 8 marks
b Illustrate the working of CMOS Invertor. 6 marks
c What is SCR? Explain working of two transistor equivalent circuit of SCR. 6 marks

Module – 3

- 5 a For an open-loop op-amp draw its transfer characteristics and derive the output voltage for a voltage follower. 6 marks

- b Solve $V_o = - [3V_1 + 4V_2 + 5V_3]$ by designing an adder circuit using an op-amp. 6 marks
- c With a diagram explain how an op-amp can be used as an Integrator and Differentiator. 8 marks

Or

- 6 a Describe any six ideal characteristics of ideal op-amp. 6 marks
- b Derive the output voltage of a non-inverting amplifier. 6 marks
- c Explain op-amp circuit as a subtractor with derivation for V_o . 8 marks

Module – 4

- 7 a Construct a BJT amplifier and also show how BJT can be used as a switch. 6 marks
- b With necessary diagram and equation explain four types of feedback. 8 marks
- c Write the pin diagram of 555 timer and explain its functions. List out four applications of 555 timer. 6 marks

Or

- 8 a Develop Barkhausen's criteria for oscillations. 6 marks
- b With a circuit explain the working of RC phase shift oscillator. 8 marks
- c Explain the working of an Astable oscillator using IC 555 timer. 6 marks

Module – 5

- 9 a Factorize Boolean Equation $Y = AB + AC + BD + CD$. Realize the AND/OR construction of this equation before and after factorization. 8 marks
- b Construct a full-adder using two half-adders and write truth-table for full-adder. 6 marks
- c Describe the basic principle of operation of a communication system by using a block diagram. 6 marks

Or

- 10 a Convert the following: 8 marks
- $(25.375)_{10} = ()_2$
 - $(111001.01)_2 = ()_{10}$
 - $(972.65)_{10} = ()_{16}$
 - $(F8E.B8)_{16} = ()_{10}$
- b Construct a decoder circuit and explain its working. 6 marks
- c Explain the block diagram of a cellular mobile radio unit. 6 marks

First/Second Semester BE Degree Examination September 2019
(CBCS Scheme)

Time: 3 Hours

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Q P Code: 60008/60017

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Module – 1

1.
 - a Draw and explain the V-I characteristics of a Silicon diode. 6 marks
 - b With a neat circuit diagram and relevant waveforms, explain the working of a centre-tapped full wave rectifier 10 marks
 - c For the circuit shown in fig Q.1(c) find V1 and V2. 4 marks

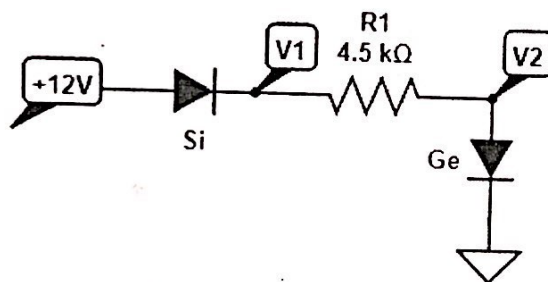


Fig Q.1(c)

Or

2.
 - a Draw and explain the V-I characteristics of a Tunnel diode 6 marks
 - b Derive the expressions for I_{dc} , V_{dc} , I_{rms} , V_{rms} , efficiency, ripple factor and PIV of a bridge rectifier. 10 marks
 - c Determine the range of input voltage in a zener voltage regulator circuit considering $R_L=1.25K\Omega$, $R=220\Omega$, $V_Z=20V$ and $P_Z(\max)=1200\text{ mW}$. 4 marks

Module – 2

3.
 - a FET is a voltage or current controlled device? Give reason. Also define the term pinch off voltage. 4 marks
 - b Draw and explain the Drain characteristics curve for JFET 8 marks
 - c With neat diagram explain the operation of two transistor model of SCR 8 marks
- Or
4.
 - a With a neat diagram explain the construction and operation of a JFET. 8 marks
 - b With neat diagram explain the operation of MOSFET in Depletion mode. 8 marks
 - c Differentiate between N-channel and P-channel FET. 4 marks

Module – 3

- 5 a Write a short note on virtual ground of an Op-Amp. 4 marks
b With a neat circuit diagram derive the expression for the voltage gain of inverting Op-Amp. 8 marks
c Design an adder using Op-Amp to give the output voltage $V_o = -[2V_1 + 3V_2 + 5V_3]$ 8 marks

Or

- 6 a Calculate the output voltage of a three input inverting summing amplifier, given $R_1 = 200\text{k}\Omega$, $R_2 = 250\text{k}\Omega$, $R_3 = 500\text{k}\Omega$, $R_f = 1\text{M}\Omega$, $V_1 = -2\text{V}$, $V_2 = -1\text{V}$ and $V_3 = +3\text{V}$. 4 marks
b Design an inverting and non-inverting operational amplifier to have a gain of 10. 8 marks
c Define the following parameters of an Op-Amp: (i) Slew Rate (ii) Input Offset Voltage (iii) CMRR (iv) PSRR 8 marks

Module – 4

- 7 a With a neat circuit diagram explain the operation wein bridge oscillator. 8 marks
b Draw and explain different feedback amplifier topologies. 8 marks
c Design a RC phase shift oscillator for 10KHz of oscillation frequency. 4 marks

Or

- 8 a With a neat circuit diagram explain the operation RC phase shift oscillator. 8 marks
b Derive an expression for gain in negative feedback configuration. 8 marks
c Mention the advantage of negative feedback. 4 marks

Module – 5

- 9 a Explain the full adder circuit with truth table. Realize the circuit for sum and carry Using logic gates (basic gates). 8 marks
b Perform the following conversions. 8 marks
(i) $(1234.56)_8 = (?)_{10}$
(ii) $(10110101001.101011)_2 = (?)_{16}$
(iii) $(988.86)_{10} = (?)_2$
(iv) $(ABCD.EF)_{16} = (?)_8$
c What are universal gates? Realize AND gate using universal gates. 4 marks

Or

- 10 a With a neat block diagram explain the basic elements of communication system. 6 marks
b Simplify the following: i) $Y = \bar{A}BC + A\bar{B}C + ABC$ 8 marks
ii) $Y = AB + \bar{A}\bar{C} + \bar{A}BC(AB + C)$
c Realize a Half adder using NAND gates only 6 marks

ADICHUNCHANAGIRI UNIVERSITY

First Semester BE Degree Examination
(CBSC Scheme)

Time: 3 Hours

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SUB: BASIC ELECTRONICS

Q P Code: 60008

- Instructions:**
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 2. Choose one full question from each module
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Module-1

- 1 a Illustrate with a diagram, the phenomenon occurring at the junction of P-type and N-type semiconductors. 6 Marks
- b Demonstrate the working of a Zener diode as voltage regulator with line regulation and load regulation expressions. 6 Marks
- c With the help of a circuit diagram explain the working of a bridge rectifier. Show that ripple factor is reduced to 0.482. 8 Marks

OR

- 2 a Explain the operation of a full-wave rectifier with centre tap transformer with input and output waveforms and show power conversion efficiency is 0.81 8 Marks
- b Illustrate the circuit diagram of a photo-diode with VI characteristics. 6 Marks
- c Explain briefly the operation of a Capacitor filter circuit. 6 Marks

Module-2

- 3 a Explain the construction and working of P-channel Enhancement type MOSFET. Also draw the transfer characteristics. 8 Marks
- (b) Apply the digital circuit of CMOS to function as an Inverter with $V_i=0V$ and $V_i=5V$. 6 Marks
- c Illustrate with a diagram, VI characteristics of a SCR. 6 Marks

OR

- 4 a Illustrate the operation of JFET with a diagram showing JFET characteristics 8 Marks
- (b) Apply the digital circuit of MOS for construction of complimentary MOS circuit. Mention two advantages 6 Marks
- c Summarize the working of SCR with the help of a diagram. 6 Marks

Module-3

- 5 a Construct the circuit of an Inverting op-amp and describe its working. Also derive the expression for its voltage gain. 8 Marks
- b Solve for V_o for the op-amp circuit shown in figure 5b. 5 Marks

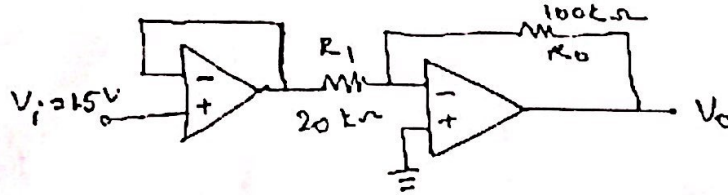


Fig 5b: op-amp circuit

- c Develop a differentiator circuit using op-amp and describe its working 7 Marks
- OR**
- 6 a Construct the block diagram of an op-amp and define slew rate and CMRR 6 Marks
- b Construct a four input inverting summer circuit and derive an expression for its output voltage. 6 Marks
- c Apply op-amp to build voltage follower and comparator circuits with transfer characteristics. 8 Marks

Module-4

- 7 a Explain internal details of IC 555 timer. 6 Marks
- b What is feedback amplifier? Briefly explain four types of feedback amplifiers. 7 Marks
- c Demonstrate working of a Wien-bridge oscillator using op-amp with the help of a diagram. 7 Marks
- OR**
- 8 a Explain the operation of transistor amplifier circuit. 7 Marks
- b Explain Barkhausen's criteria for oscillations. 7 Marks
- c Illustrate an Astable oscillator circuit using 555 timer and describe its working. 6 Marks

Module-5

- 9 a Solve for output V_o for the given circuit in figure 9a. 5 Marks

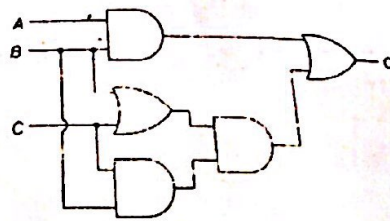


Figure 9a: Given circuit

- b Explain the full adder circuit with gates and truth table 8 Marks
- c Illustrate cellular mobile radio unit with a block diagram. 7 Marks
- OR**
- 10 a With the help of a logic diagram and truth table, explain the working of a clocked SR flip-flop. 8 Marks
- b Construct 4:1 multiplexer using basic gates. 5 Marks
- c Summarize the principle of operations of a communication system by using a block diagram. 7 Marks

**First/Second Semester BE Degree Examination November 2020
(CBCS Scheme)**

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Max Marks: 100 marks

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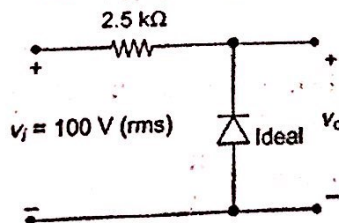
5. Write Legibly

Module – 1

- 1 a Define PN junction diode. Discuss the construction of PN Junction diode. 6 marks
- b What is a zener diode? Explain the operation of zener diode as a voltage regulator and draw its equivalent circuit. 6 marks
- c With a neat circuit diagram and waveform explain the operation of full wave rectifier and derive an equation for the ripple factor. 8 marks

Or

- 2 a Explain the operation of bridge rectifier with a circuit diagram and waveform. 8 marks
- b For the network as shown in the below figure sketch the output waveform and determine. 6 marks

 V_{dc} 

- c Describe the operation of photo diode and LED. 6 marks

Module – 2

- 3 a Discuss the construction diagram and operation of JFET for $V_{GS}=0, V_{DS}>0$. 6 marks
- b Discuss the channel formation and operation of enhancement type MOSFET. 8 marks
- c Determine the value of threshold voltage for EMOSFET. $K=0.45 \times 10^{-3} \text{ n/v}^2, I_D(\text{on})=3.5 \text{ ma}, V_{GS(\text{on})}=4.5 \text{ V}$ 6 marks

Or

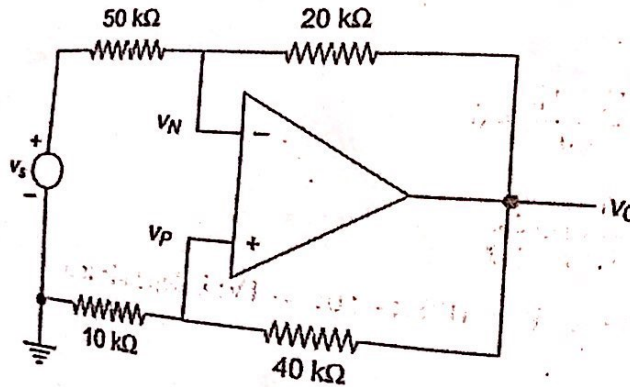
- 4 a Define SCR. Explain the VI Characteristics of SCR. 6 marks
- b With the help of figure explain CMOS inverter and mention their advantages. 7 marks
- c Mention the applications of SCR. 7 marks

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Module – 3

- 5 a With the help of block diagram discuss the operational amplifier. 7 marks
 b Discuss the concept of slew rate and CMRR of operational amplifier. 7 marks
 c For the operational amplifier as shown below the gain A is finite but $R_{in} = \infty$ and $R_o = 0$ Calculate 6 marks



Or

- 6 a Discuss the concept of summer circuit and sub or tractor with the help of equation and circuits. 7 marks
 b Describe the differentiator and integrator with output equation. 7 marks
 c Explain how an operational amplifier can be used as inverting amplifier. 6 marks

Module – 4

- 7 a With a neat diagram explain how BJT can be used as an amplifier. 7 marks
 b Discuss the principle of Feedback Amplifiers. 7 marks
 c Discuss the Transistor switch circuit to switch ON/OFF a lamp in a Power circuit using a relay. 6 marks

Or

- 8 a Explain the need of Barkhausen's criteria for an oscillator. 7 marks
 b With a help of neat block diagram discuss the RC phase shift oscillator. 7 marks
 c Discuss the 555 Timer with the help of pin diagram. 6 marks

Module – 5

- 9 a Given $m = 11010110$ and $n = 01000101$ Determine a) $(m-n)$ b) $(n-m)$ using binary operation. 6 marks
 b List and discuss the basic gates and universal gates with their logical symbol and truth table. 8 marks
 c State and prove the distributive and De Morgan's law. 6 marks

Or

- 10 a With the help of circuit and truth table explain the full adder. 7 marks
 b Explain the implementation of 3 to 8 Decoder. 7 marks
 c Discuss the process of communication, through block diagram. 6 marks
