

Total No. of printed pages = 4

SUBJECT CODE= **ECE022203**

Roll No. of candidate

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**2017**

**End Semester B TECH Examination**

**1<sup>st</sup> Semester**

**BASIC ELECTRONICS AND COMMUNICATION  
ENGINEERING**

Full Marks- 70

Pass Marks- 21

Time- 3 hours

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*The figures in the margin indicate full marks.*

**PART – A**

**Q.1. Answer all questions:**

**16 x 1 = 16**

- a) Why at very low temperature, semiconductors behave as an insulator?
- b) What do you mean by carrier recombination?
- c) If two silicon diodes are connected in parallel, then what is the voltage drop across their terminals?
- d) What is a photo diode?
- e) What do you mean by the term “quiescent point”?
- f) What is the expression for the stability factor of an emitter follower bias circuit?
- g) Why biasing is required for a transistor AC amplifier circuit?
- h) Mention four advantages of FET over BJT?

- i) Convert  $(10101.0101)_2$  into decimal equivalent.
- j) Draw the truth table for a NAND logic gate.
- k) Why do we need to convert an analog signal to digital signal for certain applications?
- l) Find the 10's complement of  $(1000)_{10}$ .
- m) What do you mean by attenuation?
- n) What do we need of demodulating a signal?
- o) What is the frequency range for a music signal?
- p) Mention any three types of communication channels.

## PART – B

**Q.2. Answer all questions:**

**3.5 x 4 = 14**

- a) Explain the effect of temperature on a P-N junction diode. Determine the forward current for a Germanium diode at room temperature when the voltage across it is 0.3 V. Assume the room temperature to be  $27^\circ\text{C}$  and the reverse saturation current is  $1\text{nA}$ .
- b) Calculate the operating point of a silicon npn BJT fixed biased circuit with  $V_{cc} = 12\text{ V}$ ,  $R_B = 470\text{ k}\Omega$ ,  $R_C = 1\text{ k}\Omega$  and  $\beta = 150$ .
- c) Find the 2's complement of  $(101010)_2$ . Subtract  $(5B)_{16}$  and  $(AD)_{16}$  and verify the answer.
- d) Classify communication systems based on direction of communication and briefly explain each one of them.

## PART – C

**Q.3. Answer any one pair of questions:**

**2 x 5 = 10**

- a) What is forbidden energy gap? Classify insulators, metals and semiconductors on the basis of band gap.

b) What is an “Avalanche effect”? Explain with proper diagram. How is it different from Zener effect?

**OR**

c) Differentiate between intrinsic and extrinsic semiconductors. Explain the concept of doping with an example.

d) Explain the working of a full wave bridge rectifier with proper diagram. Derive the expression for average or dc value of the output.

**Q.4. Answer any one pair of questions: 2 x 5 = 10**

a) What is a load line? Explain the role of the dc load line analysis in the proper amplification of a BJT amplifier.

b) Derive the expression for all the dc components for a collector to base bias circuit and an emitter follower bias circuit. Which circuit's stability is more and why?

**OR**

c) The value of  $\alpha$  for a transistor is 100. Find the value of  $\beta$ . Find the percentage increase in the value of  $\beta$  if  $\alpha$  increases by 20%.

d) Draw a neat labeled diagram of an N-channel JFET and explain its current flow mechanism. Mention its advantages over BJT.

**Q.5. Answer any one pair of questions: 2 x 5 = 10**

a) Draw the block diagram of a basic communication system and briefly explain the components. Give an example of a practical communication system.

b) Differentiate between analog and digital communication. What are the different types of channels available in a communication system?

**OR**

c) Explain the need of modulation in a communication system with an example. What are the different types of modulation techniques? Mention one advantage of each one of them.

d) What do you mean by bandwidth of a signal? What will be the wavelength of an EM wave of frequency 100 GHz? What is the frequency range of 1) light and 2) Microwave?

**Q.6. Answer any one pair of questions:**

**2 x 5 = 10**

a) What are basic logic gates and universal logic gates? Construct an AND gate using any one of the universal gates.

b) Convert the following:-

i)  $(24A)_{16}$  to octal equivalent.

ii)  $(770)_8$  to decimal equivalent

iii)  $(430.1)_{10}$  to binary equivalent.

**OR**

c) Simplify the logical expression and realize it using only two input logic gates.

$$Y = \overline{\overline{B.C.D}} + \overline{\overline{A.C.D}}$$

d) Subtract  $(11100)_2$  from  $(10011)_2$  using 2's complement. Convert the two into decimal and subtract them using 9's complement and verify the answer.