RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FIFTH SEMESTER EXAMINATION, FEBRUARY 2022

THIRD YEAR [BATCH 2019-22]

Date : 28/02/2022

COMPUTER SCIENCE (HONOURS)

Time : 11 am – 1 pm

PAPER : XII [CC12]

Full Marks : 50

Answer **any five** of the following questions: [5×10]

1. a) The barrier potential across a p-n junction diode cannot be measured by placing a voltmeter across the diode terminals. Explain the reason in brief.

   b) What is breakdown diode? Discuss how breakdown takes place across the junction of a diode.

   c) Derive expressions for DC value of load current and ripple factor for a bridge rectifier.

   d) A bridge rectifier is connected to a load resistance of 5 kΩ. At the input of the rectifier an unregulated power supply of 100 Volt (rms) is connected. Each diode of the rectifier has a forward resistance of 50 Ω. Calculate the DC load voltage and the ripple factor at the output.

   [2+(1+2)+(1+2)+2]

2. a) Define the factors α and β for a bipolar junction transistor. Establish a relation between them.

   b) A BJT is operating in the CE configuration and draws a constant base current IB of 30 μA. The collector current IC is found to change from 3.5 mA to 3.7 mA when the collector-emitter voltage V_{CE} changes from 7.5 Volt to 12.5 Volt. Calculate the output resistance and β at V_{CE} = 12.5 Volt. What is the value of α?

   c) What is thermal runaway? How can it be avoided using proper dc biasing of the BJT?

   d) Draw the h-parameter equivalent circuit of a single stage CE amplifier. Obtain expressions for input resistance and voltage gain for the CE the amplifier by using the h-parameters.

   [(1+1) +3+ (1+1) + (1+2)]

3. a) A three stage amplifier is designed by connecting three amplifiers in series. All of them have voltage gain 2 but current gain 1, 2 and 5 respectively. An input signal of 10 mW is applied to the multistage amplifier. Find the output signal power.

   b) Why is feedback necessary in amplifiers? Obtain expression for gain in feedback amplifier. Explain under which condition it can be transformed into an oscillator.

   c) Draw and explain timing diagram of LXI H, 8050. [2+3+5]

4. a) What is PSW?

   b) A main memory is specified as 4K × 8. Indicate the number of words, word size and total capacity of this memory.

   c) How is RST 7.5 is different from other interrupt lines? [3+4+3]

5. a) Compare addressing modes of 8086 with that of 8085.

   b) Describe different segment registers of 8086. [6+4]

6. a) Calculate the physical address when the content of CS in C800H and content of IP is 1234H in 8086 system.

   b) Write an assembly language program in 8085 to add two 16-bit numbers. Also calculate the estimated time to execute the program if the clock frequency is 3.072 MHz. [3+7]

7. a) Write down the characteristics of embedded systems. Explain any two of those.

   b) What are the roles of '%assign' and '%equ' directives in x86 assembly language programming?

   c) Write down about various handshake signals for programmable peripherals. [4+3+3]

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