0201N1462 Candidate's Seat No :_____

M.Sc. Sem.-1 Examination
404
Electronics
January-2024

Time : 2-30 Hours] [Max. Marks : 70

Q.1 (A) Discuss the origin of band structure in the solids and distinguish the types of solids on the basis of it. [07]

(B) Derive the Schrodinger equation which is rewritten in the plane wave basis. [07]

OR

Q.1 (A) Derive the approximate solution of central equation near the zone boundary. [07]

(B) Discuss the method to obtain the electronic band structure of periodic solids by Kronig-Penny model. [07]

Q.2 (A) Describe the effects of (i) Magnetic field and (ii) isotope on superconductors. [07]

(B) State the difference between type-1 and type-2 superconductors. Discuss coherence length of superconductors in detail. [07]

OR

Q.2 (A) What do you understand about the AC and DC Josephson effect. Describe their importance. [07]

(B) Discuss BCS theory of superconductivity in detail. [07]

Q.3 (A) Clarify electrode theory with Nernst equation. [07]

(B) Explain the electrocardiography with suitable figure. [07]

OR

Q.3 (A) Write notes on micro electrodes and body surface electrodes. [07]

(B) Describe how blood pressure is measured? Explain an instrument used to measure blood pressure. [07]

Q.4 (A) Discuss briefly the special purpose oscilloscopes with respect to their typical applications. [07]

(B) Write a note on UV, visible and IR sources of radiation. [07]

OR

Q.4 (A) Discuss the spectrum analyzer instrument and give its classification. [07]

(B) Describe operation of a spectrophotometer. [07]

Q.5 Answer in brief Any Seven questions from the following: (Each question is of two mark). [14]

(i) Define fermi energy and show how it varies with temperature.
(ii) Define Bloch function.
(iii) What do you understand by density of state?
(iv) Define Meissner effect.
(v) Explain cohesive energy.
(vi) What is cooper pair?
(vii) What are values of systolic and diastolic blood pressures in normal human?
(viii) What is electrode?
(ix) State importance of doctor's stethoscope.
(x) What do you mean by monochromator?
(xi) Draw block diagram of dual beam oscilloscope.
(xii) State different type of detector and define each one of them.

*** PAPER ENDS ***

P.T.O

M.Sc. Electronics (Semester-I) Examination (Old Course)
ELE-404 : DIGITAL SYSTEM DESIGN & MICROPROCESSOR - I

Instructions: (1) Attempt all questions.
(2) Symbols used here have their usual meanings.
(3) All questions carry equal marks.

1 (A) Design BCD-to-common cathode LED seven segment code converter for D2 to D6 using Karnaugh map and draw corresponding circuit using universal gates. (7)

(B) Discuss the working of 7-segment decoder driver using IC-7447 and IC-7448. (7)

OR

(A) Explain the working of Mod-6 counter using JK flip-flops. Draw appropriate waveforms and truth table. (7)

(B) Write the Verilog code for the given test circuit using, (7)
(i) gate level implementation, and (ii) data flow model.
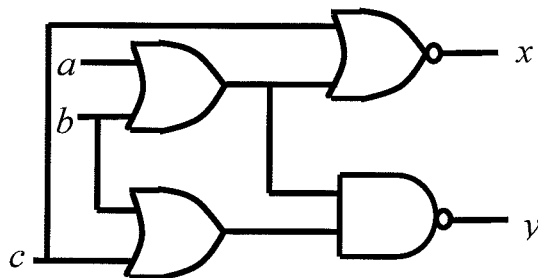
2 (A) Discuss the design of time period measurement set up. (7)

(B) Discuss the design of 1 Hz clock generators using IC-555 and IC- 5369. (7)

OR

(A) Write the Verilog code for half adder and 4-bit ripple carry adder. (7)

(B) Discuss the design of four-decimal-digit frequency counter drawing necessary block diagram. (7)

3 (A) A set of ten packed BCD numbers is stored in memory location starting at XX20H. (i) Write a program with a subroutine to add these numbers in BCD. If a carry is generated, save it in register B, & adjust it for BCD. The final sum will be less than 9999_{BCD}. (ii) Write a second subroutine to unpack the BCD sum stored in registers A & B, and store them in the output-buffer memory starting at XX40 H. The most significant digit (BCD_4) should be stored at XX40H, and the least significant digit (BCD_1) at XX43H. (7)

(B) A set of five 16-bit readings of the current consumption of industrial control units is monitored by meters & stored at memory locations starting at XX30H. The low-order byte is stored first (eg. At XX30H), followed by the high-order byte (eg. At XX31H). The corresponding maximum limits for each control unit are stored starting at XX80H. Subtract each reading from its specified limit, and store the difference in (7)

place of the readings. If any reading exceeds the maximum limit, call the indicator routine and continue checking.

OR

(A) A binary number is stored in memory location BINBYT. Convert the (7) number into BCD, and store each BCD as unpacked BCD digits in the Output Buffer. To perform this task, write a main program and two subroutines: one to supply the powers of ten, and the other to perform the conversion.

(B) A set of three packed BCD numbers are stored at XX60H. The seven- (7) segment codes of the digits 0 to 9 for a common cathode LED are stored at XX70H, and the Output-Buffer is at XX90H. Write a program & two subroutines, called UNPAK and LEDCOD, to unpack the BCD numbers & select a seven-segment code for each digit. The codes should be stored in the Output-Buffer memory.

4 **(A)** Draw the Pin and Block diagram of IC 8253. Explain its Control word (7) register.

(B) Draw the block diagram of IC 8259. Explain its interrupt operation. (7)

OR

(A) Draw 8155 Pin configuration and Block diagram. Explain its Control (7) logic.

(B) Explain the Control word and Pin diagram of IC 8255. (7)

5 Attempt any Seven questions. Each question carries Two marks. (14)

1 In HDL, *m, t,* and *n* in syntax *m'tn* represent _____

2 What is the difference between keywords **initial** and **always** in Verilog HDL?

3 Draw the logic diagram of Mod-3 counter using JK flip-flops.

4 In Verilog HDL, the keyword **reg** is used to ...... the value of a data object in a procedural assignment.

5 A 4 digit multiplexed display has a repetition rate of 100 Hz. Hence each digit will be serviced once every ..... second.

6 Draw the block diagram of 1 Hz generator using IC-4521.

7 The instruction _____ is necessary to implement the interrupts 7.5, 6.5 and 5.5.

8 The IC 8279, has a matrix keyboard with _____ keys.

9 Explain instruction XPHL

10 In IC 8255, if bit D_7 = ___, port C operates in the I/O mode.

11 The IC 8155, the timer is a _____ bit down-counter and has four modes.

12 Explain instruction XCHG.

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