

M.Sc. (Sem.-II) Examination

407

Electronics Sciences

May-2017

Time : 3 Hours]

[Max. Marks : 70

Instructions:

1. Symbols and terminology have their usual meanings.
2. Attempt all questions.

Q.1(a) Define scattering parameters for a two port network. Obtain S-matrix for E-plane tee. [7]

OR

(a) Write a detailed note on directional couples. [7]

(b) What are the different types of strip lines? Draw their structures. [7]
Discuss important properties of parallel stripline.

OR

(b) What is magic tee? Explain its operation. [7]
Explain application of magic tees as circulator.

Q.2(a) With neat diagram describe construction of two cavity klystron. Discuss the mechanism of amplification in it. [7]

OR

(a) Explain the process of bunching in a reflex klystron. [7]
Obtain equation for bunching parameter in reflex klystron.

(b) Write short notes on: [7]
(i) Planar capacitor Films.
(ii) Planar inductors.

OR

(b) Explain the amplification process in the helix type travelling wave tube. [7]
Derive circuit equation for TWT.

Q.3(a) Discuss electrode theory with Nernst equation. [7]

OR

(a) How ECG can be measured in humans? Explain. [7]

(110)

(b) Explain briefly how blood pressure can be measured in humans? [7]

OR

(b) Discuss different types of biopotential electrodes. [7]

Q.4(a) Name different types of spectrophotometers. Describe working of any one with diagram. [7]

OR

(a) (i) Draw block diagram of power scope. [7]
 (ii) Draw figure of synchroscope.

(b) Write note on different detectors used in spectrophotometers. [7]

OR

(b) Give in detail the advantages of DSO over conventional oscilloscope. [7]

Q.5 Answer following questions in brief: (Each question is of **one** mark). [14]

- (i) What is rat race junction?
- (ii) Give applications of magnetron.
- (iii) What is skin effect?
- (iv) State two main differences between shielded strip line and microstrip line.
- (v) What do you understand by MMIC?
- (vi) Define velocity modulation.
- (vii) How many elements are there in S-matrix of a magic tee?
- (viii) What is electrode potential?
- (ix) Write full name of EMG.
- (x) Write importance of doctor's stethoscope.
- (xi) What is wavelength of 30,000 MHz e.m. radiation in free space?
- (xii) What is range of visible e.m. spectrum?
- (xiii) What is the role of grating in spectrophotometer?
- (xiv) If highest frequency in signal is 5 KHz, what is the minimum sampling rate required?

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- 1. Maximum Marks 70**
- 2. Attempt all questions.**
- 3. Symbols carry their usual meanings.**
- 4. Scientific calculators are allowed**

Q1A). Discuss key switch mechanism and draw relevant schematics of bouncing of key switch. Discuss (i) Hardware key bouncing, (ii) Software key bouncing. **[07]**

OR

Q1A). List four general features of DMA controller 8257. Draw the pin diagram and the block diagram of a programmable DMA controller 8257. Give comparison between Slave and Master Modes **[07]**

Q1B). List the features of 8259. Draw the pin configuration and the functional block diagram of PIC 8259. List various blocks and discuss each one briefly. **[07]**

OR

Q1B). Discuss three techniques normally adopted to solve the problem of roll over. Discuss keyboard interface circuit **[07]**

Q2A). List name of the devices used for temperature measurement. Draw interface connections and write a program to measure and control temperature of furnace employing a microprocessor-based system **[07]**

OR

Q2A). Draw relevant schematics of (i) Sine to square wave converter (ii) Rectified square wave (iii) Interface for frequency measurements. Write relevant program. **[07]**

Q2B). Give the pin configuration and the block diagram of INTEL - 8086 Microprocessor. List various addressing modes of INTEL - 8086 Microprocessor and discuss any two with example. **[07]**

OR

Q2B). Give brief introduction of INTEL - 8086 and give classification of 8086 instructions. Discuss each one briefly. **[07]**

(P.T.O)

Q3Ai). With help of examples discuss basic data types used in C language. What is a qualifier (modifier), mention the qualifiers that can be used with integer data. [03]

3Aii). If a, b and c are sides of a triangle, area of the triangle is given by the formula

$$A = \sqrt{S(S-a)(S-b)(S-c)}$$

Where $2S=a+b+c$. Write a program to read the three sides of a triangle, calculate the area and print all three sides and area. The program also should print the value of the longest side. [04]

OR

Q3A). With help of a block diagram explain *for* loop.

Write a program to read value of x, evaluate e^x using the following series with user specified accuracy. Program also should print how many terms are to be used to get the specific accuracy. [07]

$$e^x = 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots$$

Q3Bi) Write *for* statements to print following sequence of integers [03]

- (i) 2 6 10 14 18 22
- (ii) -6 -4 -2 0 2 4 6 8
- (iii) 1 8 27 64 125

3Bii). Write down the output of the following program segment [04]

```
for (i = 1; i < 5; i++)
{
    for (j = 1; j <= i; j++)
        if ( (i+j) % 2 == 0)
            printf("1\t");
        else
            printf("0\t");
    printf("\n");
}
```

OR

Q3B). With help of block diagrams distinguish between *while* loop and *do while* loop.

Write a program to read a number, obtain the binary number corresponding it and print both numbers. [07]

Q4Ai). What is a string? With help of examples mention two methods of initializing strings. With examples discuss two methods of reading strings through keyboard. [03]

4Aii). Write a program to read two strings and append (attach) the second string on the first string (without using `strcat()`) then print both strings. [04]

OR

Q4A). Write a program to read a series of 100 values and calculate standard deviation of the series using the following formula

$$s = \frac{1}{n} \sum_{i=1}^n (x_i - m)^2 \text{ where } m \text{ is the mean of the series.}$$

The program should print mean and standard deviation of the series. [07]

Q4Bi). Write a program to read a string and a character, then check how many times the character is repeated in the string. [03]

4Bii). Write a program to read 10 x 10 matrix, find out and print sum of both diagonals separately. [04]

OR

Q4B). Write a program to read 50 values, and then arrange them in descending order. The program should print the original series and the sorted series. [07]

Q5). Answer the following questions (each of one mark) [14]

- i). Draw relevant schematic of 'general operation of a keyboard'
- ii). List names of various basic input modes of IC 8279.
- iii). List names of output operating modes of IC 8279.
- iv). Draw relevant schematic of speed measurement and display.
- v). Give name of various types of LED displays.
- vi). Give format of flags of INTEL 8086.
- vii). Explain instruction ' MOV[0311], 97H of INTEL - 8086.
- viii). The escape sequence character _____ causes the cursor to move to the next line on the screen.

ix). Find errors if any in the following program segment

```
include math.h
{      print("%d", &x)      }
```

x). Pick up C language keywords from the following default, switch, string, main, brace, colon

xi). Which of the following are invalid variable names? Why? First.name, doubles, 3rd-row, Mass, column_2

xii). Write C statements to perform the following

$$x1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a}$$

xiii). Write output of the following program segment

```
int x=2, y=3, z=4;
printf("%d %d %d %d", z/y*x, (1/y)*z*x, z/(y*z), x/y*z);
printf("%d %d %d &d", sizeof(z), sizeof(double), sizeof(8.8), (int)(z/3.0)),
```

xiv). Write down the output of the following program statement

```
printf("%6.2f %10.1e", 987.6543, 987.6542);
*****
```

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0805E436
M.Sc. (Sem.-II) Examination
409
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Candidate's Seat No : _____

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- Instructions : (1) Attempt all questions.
 (2) Symbols used here have their usual meanings.
 (3) Assume suitable data wherever necessary.

- Q.1(A) 1. Name four major differences between a microprocessor and a microcontroller. 07
 2. Draw the block diagram of 8051 microcontroller.

OR

Draw the four operation modes of Timer, drawing necessary block diagrams. 07
 Hence explain the working of each mode starting from Timer Mode 0 to Mode 3.

- (B) Discuss the function of Push and Pop Opcodes drawing movement of stack pointer. Hence explain these operations in brief. 07
 MOV SP,#30h
 MOV R0,#04h
 PUSH 00h
 PUSH 00h
 POP 01h
 POP 80h

OR

Draw the Interrupt Enable (IE) Special Function Register block and mention the function of each bit of IE in brief. Discuss the function of RST pin of 8051. 07

- Q.2(A) 1. Write five different instructions to add #02h to the A register. 07
 2. Discuss the operation and contents of Carry flag as well as Overflow flag in case of following instruction set
 MOV A, #1Ch
 MOV R5, #0A1h
 ADD A, R5
 ADD A, R5
 ADDC A, #10h
 ADDC A, #10h

OR

Discuss the function of each Rotate and Swap Mnemonic Operations giving suitable examples and diagrams. 07

- (B) Discuss in brief different Jump and Call Program ranges, drawing necessary block diagram. 07

OR

Discuss the arithmetic multiplication and division giving suitable examples. 07

- Q.3(A) With circuit & waveforms explain Six-Phase Star Half wave Rectifier circuit. 07
 Find its Rectifier Efficiency, Ripple Factor & Peak Inverse Voltage.

OR

(P.T.O)

- Discuss Transformer Utility Factor in detail. 07
- (B) Draw waveform of load current in an n -phase rectifier circuit & derive expression for rms value & percentage ripple in load current. 07
- OR
- Discuss Resistance Welding in detail with basic circuit diagram using a.c. power. 07
List the various types of resistance welding.
- Q.4(A) Discuss theory & working principle of Dielectric Heating. Derive necessary expression. List its applications. 07
- OR
- Write a short note on Resistance Sensitive Relay. 07
- (B) Explain working principle of an Induction Heating. Derive necessary expression. List its Features. 07
- OR
- Write a short note on LCD Displays. 07
- Q.5 Give short Answers: 14
1. Renasas M34501 is bit microcontroller.
 2. The equation for baud frequency of Timer 1, used in timer mode 2 as an autoloader 8-bit timer, is $f_{\text{baud}} = \dots\dots\dots$
 3. Names of any the two bit addressable registers of 8051 are and
 4. Which interrupt bit is called master or global? Why?
 5. Which interrupt bit is called nonmaskable? Why?
 6. The final output of given set of instructions is.....
MOV A, #0FFh
MOV R0, #77h
ANI A, R0
 7. Explain following operations in brief:
MOV DPTR, #1234h
MOV A, #10h
MOVC A, @A+DPTR
 8. Rectifier efficiency of three-phase half wave delta-ye rectifier is
 9. Give two uses of Polyphase rectifier.
 10. List name of four types of poly-phase rectifier circuits commonly used.
 11. Write the equation of total power P_t delivered to a dielectric piece.
 12. Name two types of Resistance welding.
 13. List two applications of Induction heating.
 14. What is Photosensitive relay?
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