2021

COMPUTER SCIENCE — GENERAL

Paper : DSE-B-1

(Embedded Systems)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer **question no. 1** and **any four** questions from the rest.

1. Answer **any five** questions :   2×5

   (a) What is the size of internal program memory of MCS-51 ? What is the maximum size if an external memory is attached?

   (b) Name at least four Special Function Registers (SFR).

   (c) Give an example of direct addressing with respect to MCS-51.

   (d) What is the difference between CY and OV flags of PSW related to MCS-51 ?

   (e) Which part of the internal RAM is related with PUSH and POP instructions?

   (f) What is maximum length of jump possible in case of SJMP? Justify your answer.

   (g) How many bytes of forward jump are possible for any DJNZ instruction?

   (h) Give examples of ANL instruction related to MCS-51.

2. (a) Describe the internal Architecture of MCS-51 with a suitable diagram.

   (b) What is the purpose of RET instruction?   7+3

3. (a) What is the difference between Concurrent and Sequential Statements in VHDL?

   (b) Explain the instruction: XCHD A, @R0 with example and proper illustration.   5+5

4. (a) Write a short note on memory organization of MCS-51.

   (b) Write an assembly language program to find out number of 1's in a byte, available in internal data memory location 50H. Store the result in the accumulator itself.   5+5

5. (a) Explain the working of Port registers of MCS-51 with a suitable diagram,

   (b) What is PCON? Explain its function.   7+3

Please Turn Over

6. (a) What are the different types of bit oriented program jumps in MCS-51? Explain in brief with a suitable example and a diagram.

   (b) What is Hardware and Software key de-bouncing? Explain with suitable examples.   7+3

7. (a) Explain stack operation in MCS-51 with proper illustrations.

   (b) What is the difference between function and procedure in VHDL? Give example.   5+5

8. (a) What is the difference between a Timer and a Counter?

   (b) Explain the different modes of serial communication possible with respect to MCS-51.   3+7

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2021

COMPUTER SCIENCE — GENERAL

Paper : DSE-B-2

(Object Oriented Programming)

Full Marks : 50

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*Candidates are required to give their answers in their own words
as far as practicable.*

Answer *question no.* **1** and *any four* from the rest.

1. Answer *any five* questions :   2×5

   (a) Define object in Java.

   (b) What is the purpose of wrapper class in Java?

   (c) What is a daemon thread in Java?

   (d) What are the different access specifier in Java?

   (e) What do you understand by the scope of a variable?

   (f) What is the role of JVM?

   (g) Illustrate typecasting in Java with an example.

   (h) What is the functionality of Appeal?

2. (a) What is constructor? Discuss about different types of constructors.

   (b) Explain the use of 'this' keyword with an example.

   (c) Why is Java preferred for software development?   5+2+3

3. (a) What are the different forms of Inheritance?

   (b) How does package differ from Interface? Explain it with suitable example.   5+5

4. (a) Write a Java program to illustrate exception handling.

   (b) Explain thread prioritization in Java.   5+5

5. (a) Write a program in Java to print the area of a circle by creating a class named Area taking the values of its radius as parameter of its constructor and having a method named 'returnArea' which returns the area of the circle.

   (b) With an example, show the use of logical and bitwise operator in Java.   5+5

Please Turn Over

6. (a) Write a program in Java to find vowels from a string.

    (b) Explain encapsulation with the help of a Java program.   5+5

7. (a) Write a Java program to check whether a number is prime.

    (b) How is JDBC used to connect database at the back-end?   5+5

8. (a) Discuss the basic principle of object oriented programming.

    (b) With an example show how multi-dimensioned array is used in Java.   6+4

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2021

COMPUTER SCIENCE — GENERAL

Paper : DSE-B-3

(Computational Mathematics)

Full Marks : 50

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Candidates are required to give their answers in their own words
as far as practicable.

Answer **question no. 1** and **any four** from the rest.

1. Answer **any five** questions : 2×5

    (a) What do you mean by planar graph? Give example.

    (b) Suppose there are two simple graphs G1 and G2. How do you verify whether G1 and G2 are isomorphic?

    (c) Define path and circuit.

    (d) Name two direct methods to solve a system of linear equations.

    (e) What are the limitations of Newton–Raphson method?

    (f) State the condition for convergence of an iteration method.

    (g) What is the condition for convergence of Gauss-Seidel method of iteration?

    (h) State the drawback of Simpson's 1/3 rd rule for solving a definite integral.

2. (a) Find $f(1895)$ using Newton's Forward Difference formula

x	1891	1901	1911	1921	1931
$f(x)$	46	66	81	93	101

    (b) State Newton–Raphson formula and criteria for convergence. 4+(3+3)

3. (a) What is Absolute error and Relative error? Explain with an example.

    (b) Solve the given equations using Gauss-Jordan method :

    $$x + 2y + 6z = 66$$

    $$3x + 4y + z = 78$$

    $$6x - y - z = 57 .$$ (3+3)+4

4. (a) Prove that the sum of the degrees of the vertices of any finite graph is even.

    (b) A simple graph G has 24 edges and degree of each vertex is 4. Find the number of vertices. Write down the formula used. 5+5

Please Turn Over

5. (a) Prove that the rate of convergence of Bisection method is linear.

   (b) Solve by Gauss elimination method, the following system of equations:

$$2x - y + 3z = 9$$
$$x + y + z = 6$$
$$x - y + z = 2 \ .$$

                               5+5

6. (a) Define Euler graph and Hamiltonian path with proper examples.

   (b) Proof that a simple graph with n vertices and k components can have at most $(n–k) \ (n–k+1)/2$ edges.   (3+3)+4

7. (a) What is the difference between Newton–Raphson and Regula Falsi method? Discuss.

   (b) Consider the following dataset :

Temp. in Celsius	140	150	160	170	180
Pressure	3.685	4.854	6.302	8.076	10.225

     Find the pressure at 175 degree Celsius using Newton's backward interpolation.   5+5

8. (a) Find a root of an equation $x^3–x–1= 0$ using Secant method correct up to two decimal places.

   (b) Find the root of the equation $2x^3–2x–5 = 0$ using Bisection method correct up to 3 places of decimal.   5+5

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