

E 1554

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Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, MARCH 2016

Sixth Semester

Core Course—COMPUTATIONAL PHYSICS

(Common for Model I B.Sc. Physics, Model II B.Sc. Physics and Physics E.E.M.)

[2013 Admissions]

Time : Three Hours

Maximum : 60 Marks

Part A

Answer all questions.

Each question carries 1 mark.

1. Explain the difference between a microprocessor and microcomputer.
2. What you mean by multiplexed address/data bus ?
3. Specify the two 8085 signals that are used to latch data in an output port.
4. What do you understand by primary memory and secondary memory ?
5. How do you define a structure in C++ ?
6. What do you mean by object in C++ ?
7. Define Trapezoidal rule.
8. Write an algorithm for second order Runge-Kutta method.

(8 × 1 = 8)

Part B

Answer any six questions.

Each question carries 2 marks.

9. What are the advantages of an assembly language in comparison with high level languages ?
10. What are tri-state devices and why are they essential in a bus-oriented system ?
11. What operation can be performed by using the instruction SUB A ? Specify the status of Z and CY.
12. Write a note on externally initiated operations.
13. What is a function in C++ ?
14. What are constructors and destructors ? How they differ from ordinary functions ?
15. What are classes ? Describe the syntax for defining classes with examples.
16. Solve the equation $e^{-x} - x = 0$ by bisection method.
17. Illustrate Euler's method with appropriate Mathematical formulations.
18. Derive the formula for numerical differentiation.

(6 × 2 = 12)

Turn over

Part C

*Answer any four questions.
Each question carries 4 marks.*

19. Data byte 28H is stored in register B and data byte 97H is stored in the accumulator. Show the contents of registers B, C and the accumulator after the execution of the following two instructions :

MOV A, B

MOV C, A

20. Write instructions to read the input port and continue to read it until both switches are closed (by an operator). When both switches are closed, turn on all the LEDs.
21. Show that the memory addressing capacity of a CPU is given by 2^n , where n is the number of address lines of the CPU.
22. Write a C++ program to assign data to members of a structure variable and display it.
23. Determine the two smallest roots of the following equation :

$$f(x) = x \sin x + \cos x = 0.$$

to 3 significant digits using :

- (i) Bisection method.
- (ii) Newton-Raphson method.
24. Compute the following integrals numerically. Remember that use of Taylor series or similar techniques may be appropriate in some cases :

(i) $\int_0^1 \sin x / \sqrt{x}.$

(ii) $\int_0^{\infty} x^2 e^{-x} dx.$

(4 × 4 = 16)

Part D

*Answer any two questions.
Each question carries 12 marks.*

25. Explain 8085 microprocessor architecture with schematic diagram.
26. Draw the functional block diagram of 8085 microprocessor and explain each signals and pinouts.
27. What do you mean by objects and classes ? Describe the implementation of objects and classes in C++ programming language.
28. Numerically approximate the integral $\int_0^2 (2 + \cos [2\sqrt{x}]) dx$ by using the trapezoidal rule with $m = 50, 100, 200, 400$ and 800 subintervals.

(2 × 12 = 24)