

(3 Hours)

[Total Marks: 80]

- N.B.: (1) Question No. 1 is **Compulsory**.
 (2) Attempt any **three** questions out of the remaining **five**.
 (3) Each question carries 20 marks and sub-question carry equal marks.
 (4) Assume suitable data if required.

1. (a) Design a suitable program model to calculate the roots of quadratic equation $ax^2+bx+c=0$ (5)
 (b) Analyze the significance of Low Power modes in Cortex-M3 processor (5)
 (c) Compare White-Box and Black-Box testing with proper application of each. (5)
 (d) Discuss the functional and non-functional criteria to choose RTOS in Embedded system? (5)
2. (a) Analyze with example where will you use Boundary scan testing and JTAG Debug testing technique. (10)
 (b) Design Automatic Chocolate Vending Machine highlighting
 i) Specification requirements (choice of components), (10)
 ii) Hardware architecture
 iii) Software architecture
3. (a) The three tasks with the IDS T1, T2, and T3 with the estimated completion time 6, 5, 8 milliseconds respectively, arrive at a ready queue together. Calculate the average Turn Around Time (TAT) and average waiting time using Round Robin task scheduling algorithm with time slice of 2 mS. Assume that there is no input/output waiting for the tasks. (10)
 (b) Demonstrate the important issues faced during Hardware-Software Co-design with any one example of real time embedded system. (10)
4. (a) Discuss the differences between RISC and CISC cores. Which of them is used in the embedded systems? Why? (10)
 (b) Draw an architecture of the ARM Cortex-M3 and discuss its any three important features (10)
5. (a) Decide whether the tasks are schedulable by Necessary and sufficient condition in an embedded system with 4 different tasks with task IDs T1, T2, T3, T4 and estimated completion time 12, 8, 10, 5 mS respectively. T1, T2, T3 and T4 have their cycle duration as 30, 40, 50 and 60 ms respectively. (10)
 (b) Recommend use of RS232 and RS485 considering various factors to choose interfacing. (10)
6. (a) Illustrate design metrics of Embedded systems with suitable graphs wherever necessary. (10)
 (b) Compare any one:
 i) Waterfall model and spiral model used in embedded system design. (10)
 ii) Bluetooth, Zig-Bee.
