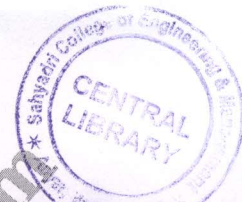


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10CS72

**Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020**  
**Embedded Computing Systems**

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting  
at least TWO questions from each part.**

**PART - A**

- 1 a. What is an embedded system? Explain the characteristics of embedded system. (05 Marks)
- b. Mention the major steps in the embedded system design process. With neat diagrams, explain the various design process in the GPS moving map. (10 Marks)
- c. Explain the state diagram for panel-active behavior in modern train controller. (05 Marks)
- 2 a. Differentiate the following with an example: (i) Von-Neuman and Hardward architecture (ii) Segmentation and paging (06 Marks)
- b. Draw a UML sequence diagram and write a program for copying characters from an input to an output device using interrupt-driven I/O. The diagram should include two I/O handlers and the foreground program. (08 Marks)
- c. Mention the limitations of direct-mapped cache. How to overcome the limitations? Explain. (06 Marks)
- 3 a. Discuss the requirement chart of a Alarm clock. (08 Marks)
- b. Explain the different types of debugging techniques. (08 Marks)
- c. With a neat sketch, explain the glue logic interface. (04 Marks)
- 4 a. Consider the following 'C' code statement  $a * b + 5 * (c - d)$ .
  - i) Draw the DFG for the above 'C' statement.
  - ii) Generate the ARM assembly code for the above 'C' statement. (06 Marks)
- b. Explain the circular buffers for the embedded programs. (04 Marks)
- c. Explain the different types of program, optimization techniques. (10 Marks)

**PART - B**

- 5 a. With a neat sketch, explain the operating system architecture. (10 Marks)
- b. Three processes with process IDs  $P_1, P_2, P_3$  with estimated completion time 10, 5, 7 milliseconds respectively enters the ready queue together in the order  $P_1, P_2, P_3$ . Calculate the waiting time and Turn Around Time (TAT) for each process and the average waiting time and TAT. (Assuming there is no I/O waiting for the processes). (08 Marks)
- c. What is the significance of spin lock? (02 Marks)
- 6 a. Explain different types of interprocess communication with an example. (08 Marks)
- b. What are the factors need to be evaluated in selection of an RTOS? Explain. (06 Marks)
- c. Explain the system architecture of an answering machine. (06 Marks)
- 7 a. Explain the typical bus transactions on the  $I^2C$  bus with a timing diagram. (05 Marks)
- b. Explain the structure of IP packet. (05 Marks)
- c. Discuss the basic class diagram for the elevator system. Include \* classes for the physical interfaces (user interface) of the elevator control panels, floor control panels and displays. (10 Marks)
- 8 a. Explain the different types of files generated during cross compilation. (10 Marks)
- b. Explain the following: (i) Incremental EEPROM Burning Technique (ii) In circuit Emulator ( $Z_{CE}$ ) Based Firmware Debugging. (10 Marks)

\* \* \* \* \*

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg,  $42+8 = 50$ , will be treated as malpractice.