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)**

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