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**Question Paper Code : 90487**

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

Seventh/Eighth Semester

Electronics and Communication Engineering

EC 8791 – EMBEDDED AND REAL TIME SYSTEMS

(Common to : Biomedical Engineering / Medical Electronics)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List two special functional units of an embedded processor used for audio player design.
2. What is meant by requirement analysis if doing memory scaling for a video accelerator?
3. Depict the three address format for instructions in ARM processors.
4. Explain the operation of instruction  
 $\text{ADD } r3, r2, r1, \text{LSL} \# 3; r3 := r2 + 8 \times r1$
5. State the use of break point and watch point support in ARM debugging.
6. Give one difference between ARM Stack and Heap.
7. State the advantage of inclusion of instruction and data cache in ARM uC.
8. State how the control of aborting of illegal memory accesses help in fault tolerance.
9. Give one challenge in developing of codes for MPSoCs.
10. How does the ARM SAP instruction provides atomic executions?

PART B — (5 × 13 = 65 marks)

11. (a) Give the Building blocks for one consumer electronic product application system built using a typical embedded processor. Give any two features in the selected processor that make its role effective in defining the product requirement analysis. (9+4)

Or

- (b) Write briefly on the following for embedded system design:
- (i) Model train controller (7)
  - (ii) designing with computing platform (6)
12. (a) With neat diagram, describe the functional blocks for one ARM microcontroller. (13)

Or

- (b) Describe for one application based on ARM microcontroller, the programming control of
- (i) Timer Unit (6)
  - (ii) PWM Unit. (7)
13. (a) Discuss on how the inclusion of ARM processor with these enhances the processor performance:
- (i) Integer unit and Floating point unit (7)
  - (ii) Coprocessor unit (6)

Or

- (b) Discuss on how the inclusion of ARM processor with more than 3 pipeline stages enhances the processor performance.
14. (a) Write briefly on:
- (i) Memory management in ARM processor (7)
  - (ii) AMBA (6)

Or

- (b) Give brief note on:
- (i) Scheduling of real time systems (7)
  - (ii) Fault tolerance techniques (6)



15. (a) Explain the following:
- (i) Video accelerator (7)
  - (ii) Distributed embedded process (6)

Or

- (b) Write short notes on:
- (i) Distributed Embedded Systems (7)
  - (ii) MPSoCs (6)

PART C — (1 × 15 = 15 marks)

16. (a) Explain briefly on how multitasking capacity of RTOS helps in engine control unit automation.

Or

- (b) Enumerate on the need for Host based system for stages of: simulation, porting kernels, estimating program run times in embedded application deployment.
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