

Time: 3 Hours

**JUNE 2014**

Max. Marks: 100

**PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.**

**NOTE: There are 9 Questions in all.**

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

**Q.1 Choose the correct or the best alternative in the following: (2×10)**

a. Embedded system is

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|------------------------|----------------------|
| (A) Singled functioned | (B) Multi functioned |
| (C) Delay system       | (D) Non-reactive     |

b. Which of the following is parallel protocol

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|-------------|----------------------|
| (A) ARM Bus | (B) I <sup>2</sup> C |
| (C) USB     | (D) Bluetooth        |

c. CAN stands for

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|---------------------------------|----------------------------------|
| (A) Common Architecture Network | (B) Cascade Architecture Network |
| (C) Cascade Area Network        | (D) Controller Area Network      |

d. Moore's Law predicts that transistor density would double in every

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|---------------------|---------------------|
| (A) 5 to 6 months   | (B) 18 to 24 months |
| (C) 12 to 20 months | (D) 24-28 months    |

e. A program that runs on one processor but executes instructions of another processor is called

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|--------------|-------------------------------|
| (A) Emulator | (B) Instruction-set Simulator |
| (C) Compiler | (D) Debugger                  |

f. Instruction throughput of microprocessor can be increased by

- |                       |                        |
|-----------------------|------------------------|
| (A) Instruction Fetch | (B) Instruction Decode |
| (C) Debugging         | (D) Pipelining         |

Code: AE68

Subject: EMBEDDED SYSTEMS DESIGN

- g. Which of the following statement is true?
- (A) General purpose processor can be mapped to PLD IC technology only  
 (B) General purpose processor can be mapped to Semi-custom IC technology only  
 (C) Single purpose processor can be mapped to PLD IC technology only  
 (D) Any processor technology can be mapped to any IC technology
- h. One time monetary cost of designing the system is called
- (A) Unit cost (B) NRE cost  
 (C) Total cost (D) Manufacturing cost
- i. In RTOS, function that works properly even if it is called by more than one task is called
- (A) Scheduler (B) Pre-emptive function  
 (C) Re-entrant Function (D) Non-preemptive Function
- j. The timer used by RTOS to maintain timing services is
- (A) Heartbeat Timer (B) Watchdog Timer  
 (C) Reactive Timer (D) System Clock

**Answer any FIVE Questions out of EIGHT Questions.**  
**Each question carries 16 marks.**

- Q.2** a. What are the commonly used design matrices for Embedded System Design? Describe various techniques that can be used to map gate-level implementation onto an IC. (8)
- b. Differentiate between FSM and FSMD. Draw and describe controller and datapath to implement Greatest Common Divisor of two numbers. (8)
- Q.3** a. Describe the various design tools used to design, test and debug embedded software. (8)
- b. What are ASIPs? Describe three major varieties of ASIPs used. (8)
- Q.4** a. Describe stepper motors and their use in Embedded Systems. (8)
- b. Differentiate between Timer and counters and describe the use of Watchdog Timer to implement timeout in Automatic Teller Machine. (8)
- Q.5** a. Compare SRAM and DRAM. Draw and explain the internal structure of RAM. (8)
- b. Describe Memory hierarchy and cache-mapping techniques. (8)
- Q.6** a. Describe various methods of Arbitration in case multiple peripherals request service from single source. (8)

- b. Explain the difference between port based I/O and bus based I/O also discuss advantages and disadvantages of Memory mapped I/O Vs Standard I/O. (8)
- Q.7** a. What is a task in RTOS? Describe various task states also explain Scheduler in RTOS. (8)
- b. Describe Preemptive and non-preemptive Kernels. Also discuss techniques to protect shared data in RTOS. (8)
- Q.8** a. Explain Event in reference to RTOS and describe the standard features of event. Compare events and Semaphores. (8)
- b. Discuss priority in interrupts and describe in detail with examples rules followed by Interrupt Routines in RTOS. (8)
- Q.9** a. Describe hard and soft real time systems. Give suitable examples. Discuss various power saving techniques in Embedded Systems. (8)
- b. Discuss encapsulation of semaphores and queues. (8)