ROLL NO. _____

Code: AE68 **Subject: EMBEDDED SYSTEMS DESIGN**

AMIETE – ET (Current Scheme)

Time: 3 Hours **JUNE 2015** **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. The main measures of ES performance are

(A) Response Time & Latency **(B)** Throughput & Speed
(C) Throughput **(D)** Response Time & Throughput

b. The RT-Level Combinational Components are

(A) Shift Register, Latch & Flip-flop **(B)** Adder and Memory
(C) Buses, Multiplexer & Decoder **(D)** Shift Register, ALU & Comparator

c. A System Call is a

(A) Mechanism of calling processor
(B) Mechanism of calling ISR's
(C) Mechanism of calling Operating System
(D) None of these

d. A Timer can measure

(A) Time Intervals **(B)** Pulses on some other input signal
(C) Both **(A)** and **(B)** **(D)** None of these

e. Examples of Non-volatile memories are

(A) EEPROM, FLASH & NVRAM **(B)** SRAM & DRAM
(C) OTP ROM, NVRAM & SRAM **(D)** DRAM & NVRAM

f. The ISA protocol provides schemes for performing

(A) Arbitration Logic **(B)** I/O Read & a Memory Write
(C) Only I/O Read **(D)** Only Memory Write

g. Why many RTOSs do not protect themselves

(A) In the interest of better performance
(B) In the interest of memory management
(C) Both **(A)** & **(B)**
(D) None of these

h. The Specific features of Message Queues, Mailboxes and Pipes services are

(A) RTOS Independent **(B)** RTOS Dependent
(C) Only few are RTOS Dependent **(D)** Only few are RTOS Independent

i. The Systems with absolute deadlines are called

(A) TASKS **(B)** EVENTS
(C) Hard Real-Time **(D)** Soft Real-Time

j. Tasks in an Embedded Systems are often structured as

(A) Queues **(B)** Structures
(C) Collection of Pointers **(D)** State Machines

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

Q.2 a. What is a design metric? List pair of design metrics that may compete with one another, providing an intuitive explanation of the reason behind the competition. **(8)**

b. List and define the three main processor technologies. What are the benefits of using each of the three different processor technologies? **(8)**

Q.3 a. Explain the programmer and Operating System considerations in ESD. **(8)**

b. What are ASIP's? Explain popular ASIP's used in ESD. **(8)**

Q.4 a. Draw the 4×4 RAM's internal structure and explain its each individual blocks. **(8)**

b. Draw and explain the profile of cache performance trade-offs. **(8)**

Q.5 a. Explain how ATM timeout can be implemented using a Watchdog Timer. **(8)**

b. Draw the hardware and explain controlling of a stepper motor using a driver. **(8)**

Q.6 a. Define arbitration method and explain any one. **(8)**

b. Explain the four popular serial bus protocols. **(8)**

Q.7 a. Explain TASKS & TASKS STATES in RTOS. **(8)**

b. Explain reentrancy & the rules to decide if a function is reentrant. **(2+6)**

Q.8 a. Explain the RTOS memory management subsystem. **(8)**

b. In RTOS environments, what are the rules Interrupt routines must follow that do not apply to task code? **(8)**

Q.9 a. Explain some few techniques to save memory space. **(8)**

b. Discuss how to encapsulate Semaphores and Queues. **(8)**