

**QP Code : 30125**

Time 3 Hrs

Marks: 100

- Note: i) Q.1 is compulsory. Solve any Four Questions from Q.2 to Q.7.  
 ii) Figures on the right indicate maximum Marks.

- Q.1 a) Compare RISC and CISC architectures 5  
 b) Compare RTOS with General Purpose OS 5  
 c) Explain Critical Section code with reference to RTOS 5  
 d) Define Embedded System. Compare it with a General Computer System 5
- Q.2 a) Explain Multi-tasking and Task Management in Real time operating systems 10  
 b) Explain various operating modes of ARM Processors. 10
- Q.3 a) Draw and Explain following interfaces - 10  
 i) 4 X 4 Scan Matrix Keyboard  
 ii) Digital controlled Relay  
 b) Describe ALU (Arithmetic & Logical) Instructions on ARM Processors. 10
- Q.4 a) Draw the Interface for 16 X 2 Alphanumeric LCD Display and Explain the LCD Display pins. (1-14) 10  
 b) Discuss Inter Process communication. Explain it with reference to Message Queues and Message Mailboxes. 10
- Q.5 a) Explain Dynamic Real Time Scheduling Algorithms. Schedule following Task sequence using Earliest Deadline First (EDF) Algorithm & draw the Timeline - 12
- |                | Task-A | Task-B | Task-C |
|----------------|--------|--------|--------|
| Start Time     | 0      | 3      | 5      |
| Execution Time | 5      | 2      | 4      |
| Deadline       | 9      | 8      | 14     |
- b) Explain with examples, different Addressing modes in ARM Processors. 08
- Q.6 a) Consider a case study of Smart Card based Access Control and Security System. System accesses user smart card with a reader and allows access to the authorized user upon verifying the card details. An electronic lock opens the door if user is authorized.(User may be asked for a PIN for additional security) A small LCD Display and Keypad is provided for user interface. System connects over Network to back end server that maintains user time log. (Login /Logout) Design the system and explain with a neat block diagram. 10  
 b) For the system designed above, describe the Software logic and operational flow with the help of suitable diagrams. 10
- Q.7 Write Short Notes (Any Three) 20
- a) System-On-Chip (SOC) Architecture  
 b) Development Tools – Assembler, Linker & Loader, Debugger  
 c) GNU-GCC Compiler, GNU Debugging  
 d) Semaphores and Mutex working  
 e) ARM Mode and Thumb Mode operations in ARM Processors

\*\*\*\*\*