

DiplETE – ET/CS (Current & New Scheme)

Time: 3 Hours

June 2018

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. An embedded system must have
(A) hard disk (B) processor and memory
(C) operating system (D) processor and input-output unit(s).
- b. Total power dissipation is reduced by
(i) reducing operating voltages
(ii) operating at lower clock frequency if processes meet the deadlines
(iii) use of wait and stop instructions when system is inactive or idle
(iv) use of cache disabling instructions
(v) optimizing the amount and type of hardware required for the system
(A) All except (v) (B) (i), (ii) and (iii)
(C) All except (iv) (D) All
- c. Which characteristics of an embedded system exhibit the responsiveness to the assortments or variations in system's environment by computing specific results for real-time applications without any kind of postponement?
(A) Single-functioned Characteristic
(B) Tightly-constraint Characteristics
(C) Reactive & Real-time Characteristic
(D) All of these
- d. What are the major forms of functionalities associated to high-level language compilers?
(A) Generation of an application program
(B) Conversion of generated code from higher level language to machine-level language
(C) Both (A) & (B)
(D) None of these

- e. What does the availability of LCD in 16 x 2 typical value indicate?
 (A) 16 lines per character with 2 such lines
 (B) 16 characters per line with 2 such lines
 (C) 16 pixels per line with 2 such sets
 (D) 16 lines per pixel with two such sets
- f. Which architectural scheme has a provision of two sets for address & data buses between CPU and memory?
 (A) Harvard architecture (B) Von-Neumann architecture
 (C) Princeton architecture (D) All of these
- g. Mask-programmed ROM has
 (A) Lowest writability (B) Lowest storage permeance
 (C) Highest writability (D) None of these
- h. Convert Decimal $(254)_{10}$ to Hexadecimal ()₁₆
 (A) FF (B) FE
 (C) FD (D) FA
- i. Main building block for software written for RTOS environment is
 (A) Task (B) Mutex
 (C) scheduler (D) semaphore
- j. The scheduler in RTOS runs _____ priority ready task
 (A) High (B) Low
 (C) Any (D) None of these

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

- Q.2** a. What is an embedded system? Define the three main characteristics of embedded systems. (6)
- b. Explain any two Processor technologies and Design technologies involved in embedded systems design. (10)
- Q.3** a. What is a single-purpose processor? What are the benefits of choosing a single-purpose processor over a general-purpose processor? (4)
- b. Distinguish between a combinational circuit and a sequential circuit. (2)
- c. Design a 3×8 decoder. Start from a truth table, use K-maps to minimize logic and draw the final circuit. (10)
- Q.4** a. Draw a neat sketch of basic architecture of General purpose processor and explain datapath and controller. (10)

- b. Explain briefly the following (6)
- (i) Assemblers
 - (ii) Compilers
 - (iii) Debuggers
- Q.5** a. Explain briefly the following (8)
- (i) Timers
 - (ii) Counters
 - (iii) Watch dog timers
- b. Given an analog input signal whose voltage ranges from 0 to 5 V, and an 8-bit digital encoding, calculate the correct encoding for 3.5 V, and then trace the successive-approximation approach (i.e., list all the guessed encodings in the correct order) to find the correct encoding. (8)
- Q.6** a. Define (6)
- (i) Mask-programmed ROM
 - (ii) EPROM
 - (iii) EEPROM and comment on their writability and storage permanence
- b. Define DRAM and SRAM (2)
- c. Compose $1K \times 8$ ROMs into a $1K \times 32$ ROM (Note: 1K actually means 1,024 words). (8)
- Q.7** a. Explain the two protocol control methods strobe and handshake. (10)
- b. Discuss the advantages and disadvantages of using memory-mapped I/O versus standard I/O. (6)
- Q.8** a. Explain Task and task states and scheduler with reference to RTOS. (8)
- b. What is shared data problem and list methods to protect the shared data and compare them. (8)
- Q.9** Discuss the Case Study of Coding for An Automatic Chocolate Vending Machine. (16)