

Total No. of printed pages = 4

EC 1317 E 011

Roll No. of candidate

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2018

B.Tech. 7th Semester End-Term Examination

EMBEDDED SYSTEMS (Elective - I)

Full Marks - 100

Time - Three hours

The figures in the margin indicate full marks
for the questions.

Answer Q.No. 1 and any six from the rest.

1. Fill in the blanks : (10 × 1 = 10)
 - (i) A microcontroller can be called a complete _____ in a chip.
 - (ii) A _____ type of memory retains its contents even when power is removed.
 - (iii) Bluetooth radios operate in the unlicensed _____ band at 2.4 GHz.
 - (iv) In _____ multitasking a task which is currently running can be context switched before it completes execution.
 - (v) An 8 bit ADC with a reference voltage of 2.56V that has bit encoding in the output of 00000001 has an input voltage of _____.

[Turn over

- (vi) The core of an operating system is called the _____.
- (vii) Embedded operating systems use a data structure called _____ to control the task state.
- (viii) The section of an embedded program that needs to be executed automatically is called the _____ section.
- (ix) One way to solve the shared data problem is to make accesses to shared resources _____.
- (x) A task that is waiting for a resource which is 'locked' is placed in the _____ state.
2. (a) What are Embedded Systems? (3 + 5 + 7 = 15)
- (b) State points on the basis of which a suitable controller can be selected for an embedded system.
- (c) Provide a generic outline of the internal hardware organization of a microcontroller / microprocessor (you may select any reference architecture of your choice if necessary).
3. (a) What sophisticated features are found in the ports of programmable digital devices?
- (b) With neat diagrams explain the general structure of timer / counter peripheral found inside an embedded processor. (7 + 8 = 15)

4. (a) Which serial communication methods typically used in devices?
- (b) What is the purpose of the Watchdog Timer peripheral found in embedded processors?
- (c) What is a bus? Provide an overview of two buses which are used in embedded computers. (5 + 2 + 8 = 15)
5. (a) What are the advantages and disadvantages of Polled I/O in embedded systems?
- (b) With the help of relevant architectural references explain how interrupts are serviced. (5 + 10 = 15)
6. (a) What are device drivers? (3 + 6 + 6 = 15)
- (b) With reference to embedded software what is the shared data problem? State a few solutions.
- (c) What are the states of a task in a multitasking embedded operating system? Using a neat diagram illustrate what information is contained in a Task Control Block (TCB).
7. (a) What are the advantages of using an operating system in embedded software design?
- (b) What are semaphores? What are different types of semaphores?
- (c) What is the function of the memory management unit of an operating system? State two memory management strategies that is used. (4 + 5 + 6 = 15)

8. (a) Describe any two mechanisms provided by the OS using which data can be shared between processes.
- (b) With neat diagrams explain any two methods of task scheduling used in RTOS'S'. (7 + 8 = 15)
9. Write short notes on the following : (5 + 5 + 5 = 15)
- (a) Hardware Software Co Design
- (b) Direct Memory Access (DMA)
- (c) VxWorks.
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