KUMARAGURU
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B.TECH DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Sixth Semester

INFORMATION TECHNOLOGY

U15ITT602**:** Embedded Systems

COURSE OUTCOMES

CO1: Explain the characteristics and components of Embedded systems, their design tools and applications.

CO2: Apply the fundamentals of digital system design and programming skills to develop Microcontroller based embedded applications.

CO3: Understand the design life cycle of embedded applications.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match related terms using multiple choice code   CO1 [K_2]

List I	**List II**
A. Scheduler	i. Waterfall model
B. Software development model	ii. Context switching
C. I/O management	iii. Device Driver
D. Performance metrics	iv. Worst case latency

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iv	iii	i
d)	iii	i	ii	iv

2. An embedded system must have   CO1   [K_2]

   a) Hard disk   b) Processor and memory

   c) Operating system   d) Brown out reset

3. Which is true about PIC16F8XX series?   CO2 [K_2]

   1.Flash memory used

   2. Capture compare PWM module used

   3. A/D converter

   4. Von-Neumann architecture

a)	1,2,3	b)	2,3,4
c)	1,3	d)	2,4

4. Identify the non – volatile memory devices.   CO1 [K$_2$]

   1. Solid state drives
   2. Flash memory devices
   3. Hard disks
   4. CPU cache

a)	1,3,4	b)	2,3,4
c)	1,2,3	d)	1,2,4

5. Assertion (A): Each connected slave to I^{2}C bus has a unique 7 – bit address   CO2 [K$_3$]

   Reason (R): In I^{2}C bus, clock is controlled by slave

   a) Both A and R are Individually true and R is the correct explanation of A

   b) Both A and R are Individually true but R is not the correct explanation of A

   c) A is true but R is false

   d) A is false but R is true

6. Which module given below allows software drivers to communicate with hardware devices?   CO2 [K$_1$]

a)	Timers	b)	ISRs
c)	Memory devices	d)	I/O Ports

7. Sequence the steps involved in pre – emptive scheduling   CO1 [K$_2$]

   1. Context switching to high priority task is done by the scheduler
   2. Low priority process is preempted by high priority task
   3. Low priority task resumes its execution
   4. High priority task finishes its execution

a)	2-3-4-1	b)	1-3-2-4
c)	3-4-2-1	d)	2-1-4-3

8. Identify the standard CAN bus data rates   CO2 [K$_2$]

   1.33 kbps CAN

   2.66 kbps CAN

   3. 110 kbps Fault Tolerant CAN

   4. 1 Mbps High speed CAN

a)	1,2,3	b)	1,2,4
c)	1,3,4	d)	2,3,4

9. Assertion (A): In HDL, a circuit is constructed by smaller parts   CO3 [K_3]

    Reason (R): Describe the operations and structures in gate level and RT level.
    a) Both A and R are Individually true and   b) Both A and R are Individually true but
       R is the correct explanation of A   R is not the correct explanation of A

    c) A is true but R is false   d) A is false but R is true

10. In FPGA, vertical and horizontal directions are separated by   CO3 [K_2]

    a) A line   b) A channel

    c) A strobe   d) A flip flop

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Compare and contrast microprocessor and microcontroller.   CO1 [K_2]
12. List any four embedded devices used in day – to - day life.   CO1 [K_2]
13. Mention the significance of Watch Dog Timer (WDT) in PIC microcontroller.   CO2 [K_2]
14. What are the various types of reset available in PIC 16F877A?   CO2 [K_1]
15. How does RTOS differs from an operating system?   CO1 [K_2]
16. What do you mean by feasibility study in the context of Software development Life Cycle (SDLC)?   CO1 [K_2]
17. Why do we need atleast one timer in an embedded system?   CO2 [K_2]
18. What are the various types of transfers supported by USB?   CO2 [K_1]
19. What is FPGA? Mention its applications.   CO3 [K_2]
20. How is an HDL different from other control – flow language?   CO3 [K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. a) Explain the architecture of PIC 16F8XX microcontroller with suitable diagram. (10)   CO2 [K_2]

    b) Explain any five bit-oriented instructions in PIC microcontroller. (4)   CO2 [K_2]

22. What are the factors to be considered in the design of an embedded system? Obtain the specification form of a Smart phone and mention the challenges involved in its design.   CO1 [K_2]

23. Draw the memory organization of PIC16F877A and explain. (7)   CO2 [K_2]

    Explain the various categories of embedded system and give examples for each (7)   CO1 [K_2]
    category.

24. Memory management is the most critical subsystem in RTOS. Why? Explain. What are the techniques involved in meeting the memory requirements in real-time? CO2 [K$_2$]

25. With a flowchart, show the steps involved in the conversion of source code into object code. Explain the significance of various tools used in the conversion process. CO1 [K$_2$]

26. a) What is an interrupt? How is it handled? Explain with an example. (10) CO1 [K$_2$]

    b) Enlist the significant features of Peripheral Component Interconnect (PCI) bus. (4) CO2 [K$_2$]

27. Explain FPGA based system design for any one embedded application. Write a VHDL code to realize any one logic gate. CO3 [K$_2$]

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