KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Sixth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U15ECT602**:** Embedded Systems

COURSE OUTCOMES

CO1: Illustrate the hardware and software architectures of Embedded Systems (K2).
CO2: Choose the appropriate communication protocol for embedded systems (K3).
CO3: Explain the architecture of ARM CORTEX M4 – TIVA architecture (K2).
CO4: Construct an embedded system with peripherals in advanced mode (K3).
CO5: Demonstrate the application of networking protocols in embedded systems (K2).
CO6: Develop applications using TMS320C67XX processor (K3).
CO7: Explain the concepts of Operating systems (K2).

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

Answer all the Questions:-
PART A (10 x 1 = 10 Marks)

1. Matching type item with multiple choice code   CO1 [K_2]

List I	List II
A. Small Scale Embedded System	i. PIC 16F876
B. Medium Scale Embedded System	ii. Atmel AT91 series
C. Large Scale Embedded System	iii. TMS320C54xx
D. DSPs in Embedded System	iv. 8051

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

2. The standard bus used in the distributed network of industrial plant controllers is -----------   CO2 [K_1]

    a) USB   b) I^2C

    c) CAN   d) Firewire

3. Which of the following are correct with regard to ARM Cortex M4? CO3 [K$_2$]

    1. No.of pipeline stages in ARM cortex M4 is 3.

    2. It is a 16 bit processor.

    3. Its operating frequency is 80 MHz.

    4. No.of Interrupts is 256

  a) 1,3   b) 1,4

  c) 1,2   d) 2,3

4. Thumb 2 instruction set consists of ---------- bit instructions. CO3 [K$_1$]

  a) 16   b) 24

  c) 32   d) 16 and 32

5. ARM processor is different from other processors as, CO3 [K$_2$]

Assertion (A): It is a RISC processor

Reason (R): Arithmetic and logic operation cannot be performed directly in memory location

  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

6. States in Test Access Port State machine of JTAG CO4 [K$_2$]

    1. Shift Data Register(DR)

    2. Capture DR.

    3. Update DR

    4. Pause DR.

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

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

7. The Communication Technology used for data transfer in Zigbee is -------------------- CO5 [K$_1$]

  a) FHSS   b) DSSS

  c) Both FHSS and DSSS   d) CDMA

8. Which of the following are true? CO5 [K$_2$]

    1. Bluetooth devices─ Piconet within 10m

    2. Bluetooth devices─ Scatternet within 1000m

    3. Bluetooth 1.x data transfer rate supported = 2 Mbps

    4. Bluetooth 2.0 data rate - 3.0 Mbps over 100 m

  a) 1,2   b) 1,4

  c) 1,3   d) 2,3

9. Assertion (A): TMS320C6X is based on the VLIW architecture. CO6 [K$_2$]

Reason (R): In a VLIW architecture, 4 instructions are fetched at a time so one fetch packet consists of 4 instructions.

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

10. The operating system used in DVD player is ----------   CO7 [K$_2$]

a)	Symbian OS	b)	MicroC/OS-II
c)	Windows	d)	Palm OS

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

11. Define system on chip (SOC) with an example.	CO1	[K$_1$]
12. Classify the processors in embedded system.	CO1	[K$_2$]
13. Compare PCI and PCI-X buses.	CO2	[K$_2$]
14. List out the various bus interfaces available in ARM Cortex M4.	CO3	[K$_2$]
15. In what ways ARM Cortex M4 differ from ARM Cortex M3?	CO3	[K$_2$]
16. What are the various operational modes of Timer?	CO4	[K$_1$]
17. Outline the features of Bluetooth Protocol.	CO5	[K$_1$]
18. Why Harvard architecture is more preferred than Von-Neumann architecture?	CO6	[K$_2$]
19. What is pipelining? What are the stages of pipelining?	CO6	[K$_1$]
20. Define Interprocess Communication.	CO7	[K$_1$]

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

Q.No. 21 is Compulsory

21. i) With neat block diagram, explain the hardware architecture of ARM Cortex M4 (8) processor.

    ii) List out the categories of ARM instruction set of ARM Cortex M4 Processor. (6) Explain any one type with example.

    CO3 [K$_2$]

22. i) Explain the software tools in designing of an embedded system. (7)   CO1 [K$_2$]

    ii) Summarize the various form of memories present in an embedded system. (7)

23. Design a table that compares the maximum operational speeds, packet format, signals used and bus lengths and give example of the uses of each of the following serial devices: a) I^{2}C b) CAN c) USB

    CO2 [K$_3$]

24.	i) Describe a Hardware module that is used for verifying the design, testing and debugging the ARM Cortex M4 Processor.	(7)	CO4	[K$_3$]
	ii) Analyze the role and importance of Timer Module in ARM Cortex M4.	(7)		

25.	i) Design a table that compares Wired and Wireless Networking.	(7)	CO5	[K$_3$]
	ii) Explain the Protocol that is suitable for WLAN applications.	(7)		

26.	Draw and explain the architecture of TMS320C6713 processor.		CO6	[K$_2$]

27.	i) Explain how thread and process are used in embedded system.	(7)	CO7	[K$_2$]
	ii) Discuss about Memory managing strategy for an Embedded System.	(7)		

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