DESIGNING WITH PROCESSORS AND CONTROLLERS
(ECEN 3222)

Time Allotted : 2½ hrs **Full Marks : 60**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 4 (four) from Group B to E, taking one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A

1. Answer any twelve: **12 × 1 = 12**

Choose the correct alternative for the following

(i) The main strength of a processor based design is
(a) Speed (b) Multiplexing of functions
(c) Versatility (d) All of these

(ii) Which is not a RISC processor?
(a) ARM (b) POWER
(c) Pentium (d) SPARC

(iii) USB port is a
(a) Parallel port (b) Slow Serial port
(c) Very fast serial port (d) All are false

(iv) Watchdog timers are very useful at the ATM kiosks because
(a) It can match the images
(b) It can detect wrong entry
(c) It resets the system after a given number of wrong tries
(d) No method described here is correct

(v) Bluetooth is a standard for
(a) Wireless communication (b) Infrared communication
(c) Cable serial connection (d) Any of these

(vi) In RISC processors, the instructions are
(a) One clock duration (b) Two clocks duration
(c) Multiple clocks duration (d) None is true

(vii) Battery back-up is provided for
(a) SRAM (b) EPROM
(c) EEPROM (d) DRAM

(viii) FSM stands for
(a) Faulty State Machine (b) Finite System Machine
(c) Free State Machine (d) None of these

(ix) TRAP is
(a) Maskable (b) Non-maskable
(c) Hardware generated (d) Both (b) and (c) are true

(x) ADC stands for
(a) Analog-to-digital converter (b) Analog domain converter
(c) Analog-to-digital coder (d) None is true.

Fill in the blanks with the correct word

(xi) ASIC stands for _____ specific _____ .

(xii) USB is a _____ protocol for _____ transfer.

(xiii) A two Kbyte memory chip requires _____number of _____ bits to address it.

(xiv) There are three busses _____, Data bus and _____.

(xv) An _____ converts assembly language program to _____ _____.

Group - B

2. (a) Draw the Blocks for a basic microprocessor system. What are the functions of the ALU, Register Array and the Control unit? Describe briefly. *[(CO1)(Remember/LOCQ)]*
(b) How would you define an embedded system? An embedded system is always designed around a controller and not a processor- justify the reason. *[(CO1)(Understand/IOCQ)]*

8 + 4 = 12

3. (a) Differentiate between Von Neumann and Harvard architecture. Explain with the help of block diagrams. Why is the Harvard architecture suited for Digital Signal Processors (DSPs)? Explain. *[(CO1)(Analyse/IOCQ)]*
(b) The microcontroller has to be reset with Power on Reset (POR) signal. Why? Draw the circuit for POR signal. What happens to the value of the Program Counter after POR is applied to 8051? *[(CO1)(Analyse/IOCQ)]*

7 + 5 = 12

Group - C

4. (a) When does parallel communication become active? Describe the advantages and disadvantages of parallel communication. Give specific examples of uses where it is preferred. *[(CO3)(Understand/LOCQ)]*
(b) Serial communication is very popular. Explain the reason. Describe how the data transfer take place using serial communication. *[(CO3)(Remember/LOCQ)]*

6 + 6 = 12

5. (a) What is Bluetooth? How does it work? What are pico-nets and scatter-nets? What is the transmit power level of Bluetooth transmitters? Mention some uses of this standard. *[(CO3)(Analyse/HOCQ)]*

(b) What is Stack in a microprocessor? Why is it very useful? What are the instructions used to operate with stack? Is the given ALP sequence correct? If not, correct and rewrite- (i) PUSH H; (ii) PUSH D; (iii) PUSH B; (iv) POP B; (v) POP H; (vi) POP D. *[(CO3)(Analyse/LOCQ)]*

6 + 6 = 12

Group - D

6. (a) Differentiate between SRAM and DRAM. Why is refreshing of RAM charge is required in DRAM? How is NVRAM better than SRAM? How does battery help NVRAM to retain charge? *[(CO4)(Analyse/HOCQ)]*

(b) Calculate the number of addressing pins required for a ROM chip if the capacity of the ROM varies like-(i) 1Kbytes; (ii) 8 Kbytes; (iii) 64 Kbytes. How does a RAM support both read and write operations? *[(CO4)(Remember/HOCQ)]*

8 + 4 = 12

7. (a) Why is software driver required for device management in embedded systems? What are the virtual devices used? Describe them briefly. Define device driver. What are the functions, drivers control? *[(CO5)(Analyse/IOCQ)]*

(b) List and describe the software tools for designing embedded systems. *[(CO4)(Remember/LOCQ)]*

5 + 7 = 12

Group - E

8. (a) What is the full form of RTOS? Why is it vital for an embedded system? How is the high level language converted to machine language? Why is the conversion to machine language necessary? *[(CO5)(Analyse/IOCQ)]*

(b) What are the different models of software design process of embedded systems? Show with a suitable flow diagram the activities of software design during the process of RTOS development. *[(CO5)(Understand/LOCQ)]*

4 + 8 = 12

9. (a) Define finite state machine (FSM). What are the differences between Moore type and Mealy type FSMs? Describe the steps required to describe a system as a state machine. *[(CO6)(Understand/IOCQ)]*

(b) What is process scheduling? When is it required? Define pre-emptive scheduler. *[(CO6)(Remember/LOCQ)]*

8 + 4 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	46.87	34.37	18.76