

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Fall

Year : 2022

Programme: BE

Full Marks: 100

Course: Embedded Systems

Pass Marks: 45

Time : 3hrs.

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

*The figures in the margin indicate full marks.*

***Attempt all the questions.***

1. a) What is an embedded System? List and define the three main characteristics of embedded system that distinguish embedded system from other computing systems. 7
- b) Design a synchronous sequential machine that produce output when input sequence is 1101 using Rs flip-flop. 8
2. a) Design a custom single purpose processor that generates Fibonacci series up to n places. Start with a function computing the desired result, translate it into a state diagram, and sketch a probable data path. 9
- b) Define Moore's law. Design an XOR gate using CMOS technology. Explain its working with the help of truth table. 6
3. a) Given the following three cache designs, find the one with the best performance by calculating the average cost of access. Show all calculations. 9
  - i. 4 Kbyte, 8-way set associative cache with a 6% miss rate; cache hit costs one cycle, cache miss costs 12 cycles.
  - ii. 8 Kbyte, 4-way set-associative cache with a 4% miss rate; cache hit costs two cycles, cache miss costs 12 cycles.
  - iii. 16 Kbyte, 2-way set-associative cache with a 2% miss rate; cache hit costs three cycles, cache miss costs 12 cycles.
- b) Design 4K×8 ROM using 1K×8 ROMs. 6
4. a) What do you mean by arbitration? Explain the daisy chain and network oriented arbitration briefly. 8
- b) Define task and explain its states. What does TCB contain? Explain. 7

5. a) What is semaphore? How semaphore can be used for global resource sharing? 8
- b) Write an assembly language program for 8051 to transfer a word "POKHARA" stored in ROM starting at location 240H to RAM starting at locations 50H onward. 7
6. a) What are different styles of modeling technique used in VHDL? Describe them. 8
- b) Write a VHDL code for 8:1 MUX using structural Modeling style. 7
7. Write short notes on: (**Any two**)  $2 \times 5$
- a) Vector interrupt
- b) Cross compiler and cross assembler
- c) The Real-time kernel