

## EE273 Microprocessor Systems — Midterm

NOV 01, 2021

Time Allowed: 60 minute

Maximum Marks: 30

**Problem 1:**

Write assembly code to evaluate  $(x \cdot \frac{x^2}{16} + 10)$  and store the result in register R1. Assume register R0 = x. The variable x is 16-bit. Maximum credit will be given to the efficient implementation using least number of instructions. (6)

**Problem 2:**

Figure 1 shows the memory contents of an ARM processor. Write the contents of PC, SP, R0, and R1 after every instruction cycle, starting from the processor reset. Show contents for PC, SP, R0, and R1 registers for first five instruction cycles. (10)

External Memory (RAM)		0x60000000
Peripherals		0x40000000
SRAM		0x20000000
⋮		
0xE7FE	(TOP B TOP)	
0x3210	(ADDS R2, R2, #0x10)	
0xFA90F1A0	(RBIT R1, R0)	
0xF24F00F0	(MOVW R0, #0xF0F0)	0x000002A4
⋮		
0x000002A5		0x00000004
0x20001000		0x00000000

Fig. 1: Memory contents for Problem 2.

**Problem 3:**

(5+5)

- Explain the concept of pipelining in cortex-M3 processor.
- Differentiate between harvard and von Neumann architectures with the help of figures.

**Problem 4:**

(4)

Consider the assembly program given in the following listing. What will be the contents of registers R1 and R2 after the execution of the following program. (Backside)

## Listing 1: Assembly program for Problem 4.

```
AREA MyMain, CODE, READONLY
data DCD 0x87654321
EXPORT __main

__main
    LDR R0, =data
    LDR R1, [R0]
    REV R2, R1

    Stop
    B Stop
    END
```



# Power Distribution Systems(EE:358)

Fall 2021 Session 2019

Marks=30

Time=60 min.

Sr.#	Questions:	Marks	CLOs-PLOs
1.	I. Explain power distribution system planning process with help of block diagram?	(3)	CLO1-PLO1(C2)
	II. Derive relationship between loss factor and load factor?	(4)	
	III. Differentiate between Time-of day and Demand rate structures, With brief examples?	(3)	
	IV. Assume that a 9 kW air conditioner would run 65% of the time (65% duty cycle) and, during the peak hour, might be limited by utility remote control to a duty cycle of 55%. Determine the following:	(5)	
	a) The number of minutes of operation denied at the end of 1 h of control of the unit b) The amount of reduced energy consumption during the peak hour if such control is applied simultaneously to 100,000 air conditioners throughout the system c) The total amount of reduced energy consumption during the peak d) d. The total amount of additional reduction in energy consumption in part If T&D losses of the T&D system at peak is 19%		
2.	I. Differentiate between Conventional, CSP and CSPB transformers on basis of ratings and protection systems.	(4)	CLO2-PLO2(C4)
	II. Compare Loop Type and Grid/Network Type Substation schemes for wiring?	(2)	
	III. Develop expression for six feeder regular hexagon shaped system for voltage drop calculation?	(4)	
	IV. Assume that the substation is served by four three-phase four-wire 2.4/4.16 kV grounded-wye primary feeders. The feeder mains are made of either #2 AWG copper or #1/0 ACSR conductors. The three-phase open-wire overhead lines have a geometric mean spacing of 37 in. between phase conductors. Assume a lagging load power factor of 0.9 and a 1000 kVA/mi <sup>2</sup> uniformly distributed load density. Calculate the following: a. Consider thermally loaded feeder mains and find the following: $I_{max}=230A$	(5)	
	a) Maximum load per feeder b) Substation size c) Substation spacing, both ways d) iv. Total percent voltage drop from the feed point to the end of the main		

# Applied Probability and Statistics

Midterm Exam (FALL 2018, Session 2017)

- Start solution of every new question on a new page.
- All the related parts of a question must be solved together.

Time Allowed: 60 Minutes  
Total Mark: 30

Q.1(a)	One-half percent of the population has AIDS. There is a test to detect AIDS. A positive test result is supposed to mean that you have AIDS, but the test is not perfect. For people with AIDS, the test misses the diagnosis 2% of the times. And for the people without AIDS, the test incorrectly tells 3% of them that they have AIDS. What is the probability that a person picked at random will test positive? [3 Marks]	(10)
Q.1(b)	What is the probability that you have AIDS given that your test comes back positive? [3 Marks]	
Q.2	A continuous random variable $X$ has probability density function. Determine: <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;">                     (i) <math>P(X &lt; 5.7)</math> [1 Marks]                      (ii) <math>P(X &gt; 6)</math> [2 Marks]                      (iii) <math>P(5.6 &lt; X \leq 6)</math> [1 Marks]                      (iv) The cumulative distribution function <math>F(x)</math> [2 Marks]                 </div> <div> <math display="block">f(x) = \begin{cases} 0 &amp; x &lt; 5.5 \\ 10e^{-10(x-5.5)} &amp; x \geq 5.5 \end{cases}</math> </div> </div>	(10)
Q.3(a)	Factories A and B produce toys. Factory A produces 3 times as many drones as factory B (i.e. for every 4 drones, 1 from A and 1 from B). A drone is considered defective if it cannot stay in the air for specified amount of time. The probability that a drone produced by factory A is defective is 0.1 and the probability that a drone produced by factory B is defective is 0.05. A drone is selected at random. What is the probability that it is defective? [3 Marks]	(10)
Q.3(b)	A drone is selected at random and is found to be defective. What is the probability it came from factory A? [3 Marks]	

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