Q: Are all of these enough to get full marks in the exam?

A: NO. This is a practice sheet. Meaning, you can practice all you want using the questions from this sheet. However, doing well in exams depends upon your ability to understand a question, formulate an answer, and express it correctly. You see, these are humane skills which cannot be guaranteed by completing a practice sheet only. But yeah, Best of luck anyway.

Chapter 2 (Instructions: Language of the Computer)

Question - 1:

Construct the equivalent RISC-V code of the following C code. Once you have the RISC-V code, identify type of each instruction and encode them accordingly.

```
A[7] = A[2] + A[B[8]] + 10;
B[i] = A[3] - 8;
```

Base addresses of array A and B are in register X_{20}Â and X_{21}Â and i is in register X_{22}

Question - 2:Â

Construct the equivalent RISC-V code of the following C code.

```
for (i = 8; i > 0 ; i--) {
Â  if ( A[i] == i){
Â  Â  Â  A[2] = A [B[3]] ;
Â  }
}
```

Base addresses of array A and B are in register Â X_{20}Â and X_{21}Â . Also consider i is in register Â X_{22}.

Question - 3:

Construct the equivalent RISC-V code of the following C code.

```
if ( A[i] < i){
Â  Â  Â  A[2] = A [B[3]] ;
}
```

Base addresses of array A and B are in register Â X_{20}Â and X_{21}Â . Also consider i is in register Â X_{22}.

Question - 4:

Construct the equivalent RISC-V code of the following C code.

```
if ( A[3] != A[6]){
Â  Â  Â  if (A[3] == 0) {
Â  Â  Â  Â  Â  Â  A[3] = A[3] + 2;
Â  Â  Â  }else{
Â  Â  Â  Â  Â  Â  A[6] = A[6] / 16;
Â  Â  Â  }
}else{
Â  Â  Â  A[6] = A[6] * 8
}
```

Base addresses of array A and B are in register Â X_{20}Â and X_{21}Â .

Question - 5:

Construct the equivalent RISC-V code of the following C code.

```
Main () {
```

```
Â  Â  Â int x = 0;
Â  Â  Â int y = 9;
Â  Â  Â int z = addition(x, y);
}

int addition (int a, int b) {
Â  Â  Â int c = a + b;
Â  Â  Â return c;
}
```

Variables x, y, z are stored in X_{20},Â X_{21}Â and X_{22} Â registers.
Argument x, y are passed using register X_{13}, X_{14}
Variable c from the addition function also uses register X_{21}

Question - 6:

Write RISC-V assembly code that checks if the number stored in register **X_{25}**Â is **even** or not. If **even** then store **1**Â in register **X_{26}**Â otherwise store **0**. Â

Question - 7:

ADD X_{25}Â , X_{25}Â , X_0Â . Can you make this instruction faster?
If yes, Write the updated instruction? Â Â Â Â Â Â Â Â
Â Â

Question - 8:Â Â Â Â Â Â Â Â Â Â Â Â Â Â Â Â Â Â Â

Memory Location	Code	Line Number	Machine Code
	ADDI **X_5**Â , X_0Â , 5	1	
	ADDI **X_6**Â , X_0Â , 1	2	
	ADDI **X_{25}**Â , X_0Â , 0	3	
	Loop: BLT **X_5**Â , **X_6**Â , loopBreak	4	____________________XXX______XXXXXXX
	Â Â Â Â Â Â ADDI X_{25}Â , X_{25}Â , 1	5	
#7080	Â Â Â Â Â Â ADDI X_5Â , X_5Â , -1	6	
	Â Â Â Â Â Â BEQ **X_0**Â , **X_0**Â , Loop	7	____________________XXX______XXXXXXX
	loopBreak:	8	

a) What is the value of **PC** while executing line2? Answer: _____________ Â
b) Fill up the machine codes corresponding to line4 and line7 in the table above. **Â Â**

Question - 9:Â

Memory Location	Code	Line Number
	Loop:	
	SLLI **X_{10}**Â , X_{22}Â , 3	1
	ADD **X_{10}**Â , X_{10}Â , X_{25}Â	2
	LD **X_9**Â , 0(X_{10})	3
	BNE **X_9**Â , **X_{24}**Â , Exit	4
#80016	ADDI X_{22}Â , X_{22}Â , 1	5

	BEQ **X0**Â , **X0**Â , Loop	6
	Exit:	

a. Fill up the memory locations.
b. Find the SB-type instructions from the above code and encode them accordingly.
Given,

Â Â Â Â Â Â Â Â Â Â Â Â I. opcode = $(103)_{10}$, funct3 = $(000)_2$Â opcode for BEQ

II. opcode = $(103)_{10}$, funct3 = $(001)_2$ Â opcode for BNE

Question - 10:Â

Write necessary RISC-V instructions to store the value (1111 1111 0000 1111 11)2 in X20 register.

Question - 11:Â

Show how the value 0xabcdef12 would be arranged in memory in RISC-V machine.

Question - 12:Â

For the RISC-V assembly instructions below, what is the corresponding C/high level statement?

Â slli x30, x5, 3 Â Â add x30, x10, x30 Â slli x31, x6, 3 Â add x31, x11, x31 Â ld x5, 0(x30) Â Â addi x12, x30, 8 Â ld x30, 0(x12) Â add x30, x30, x5 Â sd x30, 0(x31)	Assume that the Â variables f, g, h, i, and j are assigned to registers x5, x6, x7, Â x28, and x29, respectively. Assume that the base address of the Arrays A and B are in registers x10 and x11, respectively.