

Electronics System Design – Mid Semester Exam (Feb 2024)

Please note the following:

1. Please attempt 10 questions from the below set of questions.
2. Each question is for 4 marks. Total exam score is 40 marks
3. Total time for exam is 90 minutes

- Q1. What are the 5 differences between MCU and MPU. Answer with some examples.
- Q2. How do you define Embedded Systems and their differences with a computer? List 5 differences.
- Q3. How do you define Von Neumann Architecture and Harvard architecture. Specify the differences
- Q4. Design the block diagram for IR LED based remote control.
- Q5. Design the block diagram for Smart-BP Machine.
- Q6. How would you define an embedded system ecosystem offered by semiconductor companies? Provide any examples to justify the answer.
- Q7. Anode of an LED is connected VDD of the circuit. A serial resistance connected between LED cathode and GPIO of an MCU is measuring 2K. What is the current flowing from the LED and the state of the GPIO to make the LED emit light ? Consider Typical voltage of the circuit is $V_{DD} = 3.3V$. Draw the circuit and make suitable assumptions.
- Q8. Write down 5 features of STM32CubeMx tool. How is it useful to design an embedded system?
- Q9. You are asked to design a smart-watch to measure the steps taken by the user. Which communication technology would you use to download the steps count data ? Justify with reasons.
- Q10. A General purpose MCU datasheet mentions the following specifications

	Symbol	Min	TYP	Max	Unit
Absolute maximum ratings	VDD	-0.3		4.0	V
Standard operating voltage	VDD	1.7		3.6	V
Oscillator frequency	fOSC_IN	4	8	48	MHz

Designer decides to use this MCU in a circuit with following conditions. What challenges do you see in these ? Justify ?

- a. Using external crystal of 48MHz at 3V
- b. Using external crystal of 8MHz at 4.0V
- c. Using external crystal of .8MHz at 3V
- d. Using external crystal of 4MHz at 1.65V

Consider crystal has 1000 ppm tolerance and power supply connected at Vdd has 5% tolerance. Make other suitable assumptions and specify them.

- Q11. What is the process of designing an Embedded system. Specify different stages of these with explanation
- Q12. A GPIO of the MCU powered at 3.3V needs to communicate on digital interface with an external device which is providing 5V signals. What design considerations needs to be taken for effective communication between the devices ?

Electronics System Design – End Semester Exam (May 2024)

Please note the following

1. Please attempt 10 questions from the below set of questions
2. Each question is for 4 marks. Total exam score is for 40 marks
3. Total time for exam is 180 minutes

- ✓ Q1. Draw the System block diagram of the Embedded System made by you in the project? Please explain different blocks.
- ✓ Q2. Write down 5 technical challenges you encountered during the development of the project. How did you solve them? Explain with specifics.
- Q3. Did you do the power analysis of the project? What are the key findings of the power analysis in your project. How did it impact your design choices?
- ✓ Q4. Which project apart from yours was interesting for you from the design done by other groups? Which key features of the project were interesting for you in terms of ESD course content? Please explain in atleast 4 comments.
- Q5. Which evaluation board have you used in your project?
 - ✓ a. At what voltage MCU was operating?
 - ✓ b. What is the frequency at which the MCU operates on the board?
 - ✓ c. Which features did you use for the board which made it easier to make the project? Explain in 4 bullets.
- Q6. What are the decision making factors between the usage of a professional (license paid) or open-source tool chain that a product design engineer has to take. Justify with atleast 4 factors and examples in tabular form.
- ✓ Q7. In a smart-street lighting system, which different multiple kinds of communication technologies can be used between the light controller and the web interface? Justify with reasons for such choices?
- Q8. Why do we see 32.768kHz XTAL on some of the evaluation boards and embedded designs? Which applications would need them? Give examples. Which applications will not require the usage of this XTAL, give examples.
- ✓ Q9. What are the features of SPI or I2C communication. How to do describe the connections between 2 devices communicating on the interface? Explain with drawing.
- ✓ Q10. What are the features of UART communication. How do you describe the connections between 2 devices communicating on UART? Explain with drawing.
- ✓ Q11. Draw the UART data packet communication diagram between transmitter and receiver Explain the bits of the communication packet. Explain with drawing.
- Q12. When interfacing a sensor to 8bit ADC, Make a connection diagram. how will you calculate the weightage of 1bit of digital count converted by ADC which is referenced/powerd by 3.3V?

SSH215 Nation and her Narratives

Mid-semester examination

Marks : 20

Date : 2 March 2024

Time : 3 - 4 p.m

Answer the following questions briefly:

- 1/ I made preparations to leave the town in a couple of days, leaving the engine to its fate, with all its commitments. However, Nature came to my rescue in an unexpected manner. (2+2)
 - a. Who is the speaker? Why were the "preparations to leave the town in a couple of days" being made?
 - b. How did "nature" come to rescue the speaker? Why was it "unexpected"?

- 2/ No sooner had Dhurjati Babu made the above comment than he put his fork down, picked up the fly-flap from the table and with one deft slap killed a mosquito that had settled on it. (1.5+2.5)
 - a. What was the context of the comment that Durjati Babu made?
 - b. Where did the narrator first meet Durjati Babu? Which places did they visit together subsequently?

- 3/ I tried to laugh her fear gently away, but then she would turn round on me seriously, and ask me solemn questions. (2+2)
 - a. Who is the speaker here? What were these "solemn questions", and who were asking them?
 - b. What, according to you, are the reasons for such "solemn questions"?

- 4/ Where is the gold bangle my father gave you, woman."
"You need not worry. Najab will return with cloves." (2+2)
 - a. Comment on the context here.
 - b. What did Najab return with? How was that understood to be valuable/auspicious?

- 5/ "Were you calling me, Dada?" "I was thinking," said the postmaster, "of teaching you to read." And then for the rest of the afternoon he taught her the alphabet. (1.5+2.5)
 - a. Why did the postmaster decide to teach Ratan? How far did she learn before the postmaster fell sick?
 - b. What do you know about the postmaster based on the information shared by the author, Rabindranath Tagore? Comment on the postmaster's association with Ratan.

SSH215 Nation and her Narratives
End Semester exam 30 marks
6 May 2024, 2:30 - 4:30 p.m. Time: 2 hours

A. Please answer these questions briefly in the first 20 minutes. Please use the supplementary sheet for this purpose and write your name, roll number. Also mention your group TA's name. Each question carries 1 mark. (1x10 = 10)

1. What kind of moustache did Nariman Hansotia have?
2. How old was the fisherman's daughter in the poem "Hunger"?
3. What was the name of the place (name the specific city/town) where Darshan Singh lived before deciding to cross the river Raavi?
4. Insert the correct words: "You called me wife, I was taught to break _____ into your tea and to offer at the right moment the _____."
5. What time of the day did the father travel back home in "Father returning home"?
6. What fish was Hira Bai frying for Nariman's dinner?
7. How old were Sughra and Basharat in the story "The Assignment"?
8. Insert the correct information in the sentence: "Just before _____, Bishen Singh, the man who stood on his legs for _____ years, screamed and as officials from the two sides rushed towards him, he collapsed to the ground".
9. In "Squatter", there is a mention of a Shakespearean play. Which one?
10. What was the name of Bishen Singh's friend and daughter as mentioned in the story, "Toba Tek Singh"?

B. Answer the following questions taking into account the context, elaborating on the details as required, including your critical analysis. Each question carries 5 marks. (4x5=20)

- ✓ "For, love is Narcissus at the water's edge, haunted by its own lonely face, and yet it must seek at last an end, a pure, total freedom, it must will the mirrors
To shatter and the kind night to erase the water."

Explain the reference to Narcissus here? Why is the association drawn and how does the narrator plan to resist it?

- ✓ "For the last ten years, on the occasion of Id, I have always taken my small gift to Judge sahib. After I am gone, it will become your duty."

Who is the speaker and to whom is this sentence being addressed? Was the duty completed? Elaborate on the context and outcome of the "duty".

- ✓ The protagonists of Nariman's stories are Savukshaw and Sarosh. Comment on these characters and why they matter to the theme of "Squatter"?

- ✓ "The train was waiting at the station, but there was no free space in it. People seemed to sprout from the roofs of the compartments like grass."

Elaborate on the context of this situation with reference to the short story "Raavi Paar". Why is the journey across the river Raavi significant here?