

# Parikshit

## *Communication Sub-System*

### Mandatory Task:

1. Learn the concepts behind Amplitude Modulation (DSB-FC, DSB-SC, SSB), Frequency Modulation, Amplitude Shift Keying and Frequency Shift Keying. Modulation schemes is a pretty big concept. Do not limit yourselves in the understanding of the above given schemes and modulation's importance in general.
2. Candidates applying to the Communications Subsystem must demonstrate a basic understanding of RLC circuits and diode operation, as these concepts are fundamental to the design and functioning of the satellite's communication systems.

We expect the candidate to finish the above tasks compulsory before attending the interview. The interview will be based on the above concepts. Make a detailed report of your understanding on the above concepts. Your participation in the Task Phase Recruitment challenge given below will give you a better shot at getting into the Task Phase.

### Task Phase Recruitment challenge:

We have given you details on transmission board and receiving board involved in a communication link between the satellite and the ground station.

Frequency: 435 MHz

Bandwidth: 34 kHz around the center frequency

Modulation: Quadrature Phase Shift Keying (QPSK)

#### Transmitter Design:

[Microcontroller (STM32H7 - QPSK Modulation)]

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[Quadrature Modulator (ADRF6720)]

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[Lowpass Filter (LFCN-450+)]

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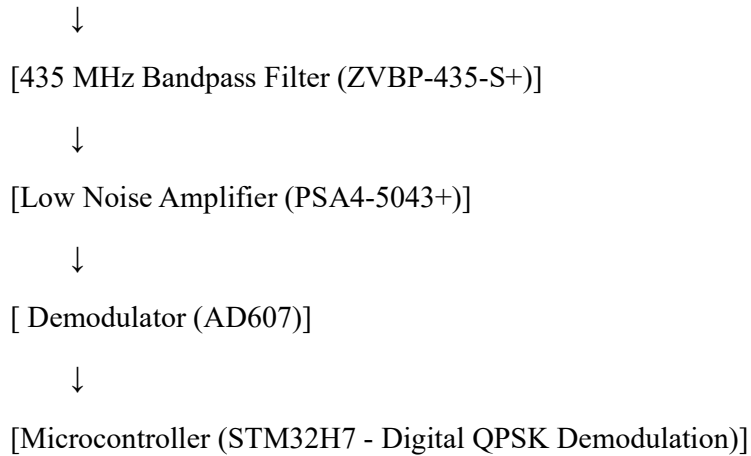
[Power Amplifier (GVA-84+)]

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[Antenna: Crossed Dipole (Satellite) / Yagi RHCP (Ground Station)]

#### Receiver Design:

[Antenna: Crossed Dipole (Satellite) / Yagi RHCP (Ground Station)]



**The Challenge:**

1. Learn about gain and decibel first for ease of understanding. (5 marks)
2. You have to go through basic architecture of communication link (The components involved in both receiver and transmitter side and their importance in the link) (20 marks)
3. Learn about link budget and calculate link budget for the given system. (10 marks)
4. Make a detailed report on everything you learn on the way. Make sure to note every definition you think important for this challenge. Clearly illustrate link budget calculations every step. (15 marks)

Total: 50 marks weightage

Finding mistakes in the challenge *if any* will be rewarded accordingly.

**Note:**

1. Cracking the recruitment challenge with a detailed step by step report will put you ahead of the crowd when it comes to Task Phase recruitment.
2. You can attend the interview irrespective of your progress in the challenge. It does not eliminate you.

Each of these components have datasheets online. Datasheets contain enormous information on the corresponding component. Look into them to get details that you need for your challenge.

This challenge is important for your recruitment into task phase. Your effort and eagerness to learn is evaluated in this challenge and the interview will be based off your report on this challenge and the mandatory tasks.

You must be able to explain everything in your report with clarity. Although cracking the challenge might be important, your understanding on whatever you have done is appreciated better.

All the decisions taken by Parikshit Team will be final throughout the entire recruitment process.

Good Luck

With regards

Comms Sub-System,

Parikshit