PROJECT INSTRUCTIONS

1) This is an **team** project, teams can be composed of $2 - 3$ students.
2) All team members are accountable for all project parts.
3) Team reports (including source codes, figures or comments) are **not to be shared** with others, neither before nor after submission.
4) Any copied reports, either fully or partially, will receive 0 points. This applies to both the original and the copy.
5) Submission is by the due date. **Late submission** is allowed for 10% deduction per day (or part of a day), for a maximum of 5 days.
6) In submission, you have to submit **.m files** separately. In addition, the figure should be submitted in **.fig format** and should be **included** in the **.pdf report**. Reports should be comprehensive and readable on their own.
7) The **.pdf report** is the main document to be evaluated, *i.e.* no credit is given for the source codes. However, source codes are to be checked against plagiarism.
8) **Each team is required to use the best practices of project management in planning for and implementing the project. Then, the team will fill-in a Project Management Assessment.**
9) Grading will depend on:
   - **40%**: Completeness and correctness of every deliverable (as per the .pdf report)
   - **40%**: Clarity of figures, and proper labeling (as per the .pdf report)
   - **20%**: Report writing and organization

PART A: DSB QAM USING MATLAB

In this part, you are required to generate a DSB-QAM signal as follows:

1) Generate the message signals $m_1(t)$ and $m_2(t)$, shown in Figs. 1 and 2, and plot them.
2) Generate the modulated signal, $s(t)$, using a carrier wave of 5 Volts amplitude and 5 KHz frequency.
$$s(t) = A_c m_1(t)\cos(2\pi f_c t) + A_c m_2(t)\sin(2\pi f_c t)$$
Plot the output signal, $s(t)$, and **comment** on it.
3) Implement the QAM receiver in Fig. 3 to extract both $m_1(t)$ and $m_2(t)$ from $s(t)$. Plot the output signals of the Receiver.
4) Repeat the previous extraction step if the receiver's carrier signal is $\cos(2\pi f_c t + \pi/3)$.
5) Repeat the previous extraction step if the receiver's carrier signal is $\cos(2.02\pi f_c t)$.

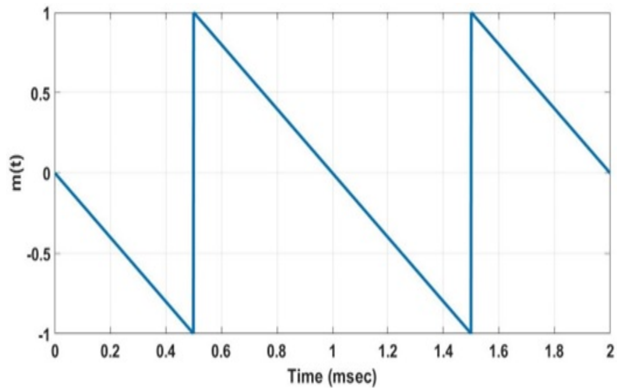

Fig. 1: Information signal $m_1(t)$

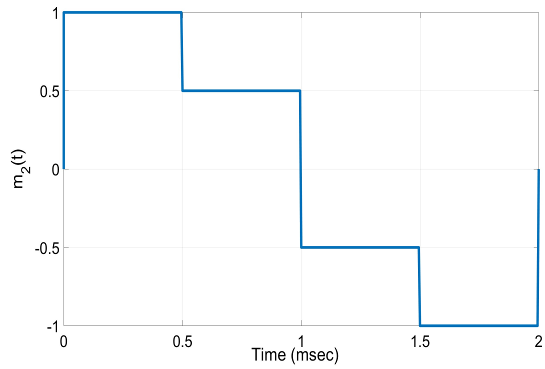

Fig. 2: Information signal $m_2(t)$

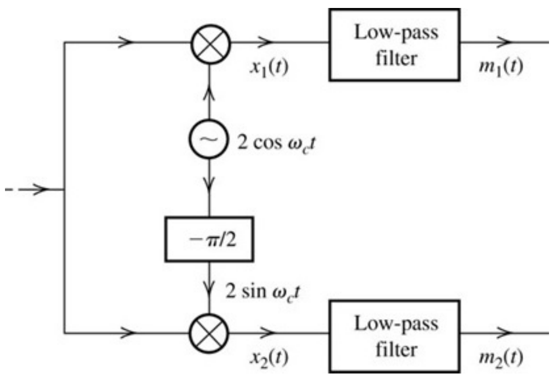

Fig. 3: QAM Receiver

Deliverable - Part A

Deliver, electronically, the following in a .zip file

1) Source codes (**.m files**) to generate the required signals.
2) Figure plots (**.fig files**) of the required signals.
3) A **.pdf file** of a complete report, including the figures, properly labeled and titled. The report should also include your comments.

PART B: ANGLE MODULATION USING MATLAB

In this part, you are required to generate angle modulated signals as follows:

1) Generate the message signals $m_1(t)$ and $m_2(t)$, shown in Figs. 1 and 2, and plot them.
2) Generate the modulated signal, $s_1(t)$, using a carrier wave of 1 Volt amplitude and 10 KHz frequency.
$$s_1(t) = A_c \cos\left(2\pi f_c t + k_p m_1(t)\right)$$
Plot the output signal, $s_1(t)$, for $K_p = 0.05$ and **comment** on it.
3) Repeat the previous part for $k_p = 1$, $k_p = 5$, and $k_p = 10$. What is the observed difference when the value of k_p changes?
4) Generate the modulated signal, $s_2(t)$, using a carrier wave of 1 Volt amplitude and 10 KHz frequency.
$$s_2(t) = A_c \cos\left(2\pi f_c t + k_f \int_{\infty}^{t} m_2(\tau) d\tau\right)$$
Plot the output signal, $s_2(t)$, for $K_f = 1000$ and **comment** on it.
5) Generate the modulated signal, $s_3(t)$, using a carrier wave of 1 Volt amplitude and 10 KHz frequency.
$$s_3(t) = A_c \cos\left(2\pi f_c t + k_f \int_{\infty}^{t} m_1(\tau) d\tau\right)$$
Plot the output signal, $s_3(t)$, for $K_f = 2000$ and **comment** on it.

Deliverable - Part B

Deliver, electronically, the following in a .zip file

1) Source codes (**.m files**) to generate the required signals.
2) Figure plots (**.fig files**) of the required signals.
3) A **.pdf file** of a complete report, including the figures, properly labeled and titled. The report should also include your comments.