**An-Najah National University**

**جامعة النجاح الوطنية**

**كلية الهندسة**

**قسم الهندسة الكهربائية**

**Faculty of Engineering**

**Department of Electrical Engineering**

**Electrical Engineering Department**

**Principle of communications (69322)**

**First exam**

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| **Instructor Name: Falah Mohammed** | **Student name:** |
| **Academic Year:2016/2017** | **Registration number:** |
| **Semester: spring** | **Serial number:** |
| **Credit Hours: 3** | **Section** |
| **Date: Monday, October 10, 2016** | **Total exam marks 20** |
| **Exam Duration:50 minutes** | **Exam weight 20** |

*Exam Notes:*

1. Close Books & Notes.
2. Read each problem carefully before attempting to solve it.
3. Write all work on this exam paper.

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| **Question** | **Marks** | **ILO’s** | **ILO’s %** | **Question grade** | **Required time** |
| **Q1** | **10** |  |  |  |  |
| **Q2** | **10** |  |  |  |  |
| **Student grade** |  | 50 minutes |

Good Luck

1. (ILOs 2) 10 pts

An AM modulator has an output of $ϕ\_{AM}\left(t\right)=100cos4000πt+40cos3000πt+40cos5000πt$.

1. Find the modulation index of the AM modulated signal
2. Determine the power of the AM modulated signal
3. Sketch the resulting line spectrum
4. Determine the bandwidth required for the transmission of this AM signal
5. How much is the carrier amplitude that is required to obtain an efficiency of 20%?

1. (ILOs 1) 10 pts

A given message signal has the magnitude spectrum as shown in Figure 1. If this signal is multiplied by a cosine carrier whose carrier frequency is $f\_{c}$

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Figure

1. Sketch the resulting magnitude spectrum if single side modulation is to be generated with upper side band
2. Determine the bandwidth of the resulting signal upper side band signal
3. Sketch the block diagram of the modulated signal
4. Can this signal be demodulated by using an envelope detector?