(a) This exam measures ILOs no *[a8, a15, b15, b16 and c18]*

(b) **No. of pages: 1** - No. of questions: 4

(c) Ask for clarification if any question statement is not clear to you.

Question # 1 (10Marks) [*measures ILOs of a.8.1, a.8.2, b.16.1*]

1. Explain the principle operation of fast wave gyro devices. (2 Marks)
2. Explain the parametric amplifier basic operation. (3 Marks).
3. Sketch the block diagram of THz spectrometer "super lattic multiplier". Then, identify the function of each component. (5 Marks)

Question # 2 (10 Marks) [*measures ILOs of a.8.1, a.8.2, b.16.1*]

1. "There are some devices dependent on non linear reactance that varies with time" explain in details. (2 Marks)
2. Identify "Manely- Rowe Power Relation".(3 Marks)
3. Identify the image sensor. Explain how can used an electronic device as image sensor and why?(5 Marks)

Question #3: (10 Mark) [*measures ILOs of a15, b15, b16 and c.18*]

A- i- Explain, with the aid of sketches and diagrams the steps of pulse position modulation generation.

ii- Based on the analysis of part i, draw a block diagram of PP demodulation. [a.15.1, b.15.1 *(4 marks)*]

B- With the aid of analysis and diagrams, find the advantages of sigma delta modulation over delta modulation. [b.16.1*(3 marks)*]

C- Draw the generator circuits for BFSK and BPSK and then compare between their outputs on the basis of signal in time domain, spectrum, band width [a.15.1, b.15.1, c.18.1 *(3 marks)*]

[Question#4: (10 Mark) [*measures ILOs of a15 and b15*]

A- Compare between Line codes and Error Control codes and then explain the principles that decide the validity of a certain code for a specified communication link. [a.15.*1(3 marks)*]

B- Draw the electronic circuits that generate the following line codes.

   i- AMI   ii- Manchester   iii- Differential   and then **find:**

The output of each of them, if the input data stream is "0111001010" [b.15.2 *(3 marks)*]

C- A CRC is constructed to generate a 4-bit FCS for an 11-bit message, the generator polynomial is $X^4 + X^3 + 1$ [b.15.2 *(4 marks)*]

   i- Draw the circuit that would perform this task

   ii- Encode the data bit sequence "10011011100", illustrating the operation of the generator through a truth table

   iii- Explain the algorithm that is used to detect error