



This Exam measures the ILOs [a8, a15, b15, b16 and c18]

Answer the following questions:

[1] Question One: (12 Mark) *[measures ILOs of a15, b15, b16 and c18]*

A- Construct an electronic circuit that can be used to generate pulse position modulation.

(3 marks)

B- Explain the process of companding in PCM system, illustrating why it is needed. (3 marks)

C- i- Explain, with the aid of sketches and diagrams, the operation of delta modulation system.

ii- Consider a delta system designed to accommodate analog signals limited to bandwidth of 5KHz. A sinusoidal test signal of amplitude of 1v and frequency of 1KHz is applied to the system. The sampling rate of the system is 50 KHz. Calculate the step size to minimize the slop over load and then determine the signal to quantization noise ratio for this test.

(3 marks)

D- 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 "01101001" (3 marks)

[2] Question Two: (8 Mark) *[measures ILOs of a15 and b15]*

A- Draw the spectrum of ASK, BPSK and M-ary FSK, and hence deduce the null to null bandwidth in each case (3 marks)

B- State and explain an experimental tool that can be used detect and specify the errors in the received signals in case of M-ary PSK and M levels QAM. (3 marks)

D- Write down a matlab code to plot the variation of the bit error rate versus the signal to noise ratio in case of M-ary PSK. (2 marks)

**[3] Question three: (10 Mark)** *[measures ILOs of a8 and b16]*

- A) **Sketch the circuit** diagram to study the characteristics of the reflex klystron tube and to determine its electronic tuning range, then explain the function of each component. (3-marks)
- B) **What are** the types of image sensors? explain the basic operation one of them. (3-marks)
- C) **Sketch the circuit** diagram to study the characteristics of Gunn Diode and to determine the threshold voltage, then explain its procedure. (4-marks)

**[4] Question four: (10 Mark)** *[measures ILOs of a8 and b16]*

- A) **What are** the Characteristics and applications of Pulsed THZ Spectrometer? (3-marks)
- B) **Design circuit to** determine the frequency and wavelength of a microwave in a rectangular waveguide operated in TE<sub>10</sub> mode. **Then explain** the mechanic techniques and electronic Technique and **bring out** a relationship between the guide wave length and cut of wavelength? (5-marks)
- C) **What is** the purpose of slotted line in the microwave bench? (2-marks)

Best Wishes

Committee of Correctors and Testers

Dr. Noha A. Al-shalaby

Dr. Shamia Ghamry