Roll No. .....

24422

B. Tech. 7th Semester (EE) Examination – October, 2020

DIGITAL SIGNAL PROCESSING

Paper : ECE-409-F

Time : 1.45 hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt any three questions. All questions carry equal marks.

1. Answer the following briefly :

(a) Define aliasing.

(b) What is the condition for system stability ?

(c) Discuss applications of DSP.

(d) What do you mean by Decimator ? Explain briefly.

(e) What is Z-transform of :

$$1/(1-az^{-1})$$

2. (a) Write the major classification of Systems with example.

(b) Discuss the properties of Fourier transform.

3. (a) Explain the Unit step response of an LTI system.

(b) Find Fourier transform of :

$$f(t) = e^{-at}.\cos bt$$

4. (a) State and explain Sampling Theorem. Also explain the process of reconstruction of the signal from its samples.

(b) Give applications of Sampling Theorem.

5. (a) Determine the z- transform of Analog input signal $x(t) = e^{-at}$ applied to a digital filter.

(b) Find inverse z-transform of the system function :

$$X(Z) = 1/(1+z^{-1})(1-z^{-1})^2$$

6. (a) Explain basic fundamental of digital filtering. Also give its advantages and disadvantages.

(b) What are different design techniques of digital filters ? Explain Bi-linear transformation designing techniques for filters.

7. (a) Explain in detail the rectangular window technique for FIR filter design.

(b) Compare an IIR filter with FIR filter.

8. Obtain the polyphase decomposition of the filters with the filter transfer function :

$$H(Z) = (1+3z^{-1})/(1+5z^{-1})$$

9. Explain :

(a) Digital filter banks

(b) Interpolation Filter

(c) Properties of ROC