Reg. No. :

Question Paper Code: 99B02

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Elective

Biomedical Engineering

19UBM901- BIOMEMS AND NANO ELECTRONICS

(Regulations 2019)

Duration: Three hours   Maximum: 100 Marks

Answer All Questions

PART A - (10x 2 = 20 Marks)

1. List out the Advantages of Polymers that enables to deploy them in MEMS   CO1- U
    Technology

2. What is the basic orientation of Quartz?   CO1- U

3. Define Pull in effect.   CO2- U

4. What is the application of inchworm motor?   CO2- U

5. What are Shape memory alloys?   CO3- U

6. What is difference between scanning and tunneling microscope?   CO3- U

7. What are magnetic sensors?   CO4- U

8. Why cellular bio scanning is important in Nano sensor.   CO4- U

9. How are nanotubes used for cancer?   CO5- U

10. How are Nano materials used in cancer treatment?   CO5- U

PART – B (5 x 16= 80Marks)

11. (a) Compute DFT for the following sequence $x(n)=(-1)^n$ for N=8   CO2- App   (16)

                                    Or

    (b) Compute IDFT for the following sequence $x(n)=(-1)^n$ for N=8   CO2- App   (16)

12. (a) Use the Bilinear transformation to convert the analog filter with CO4- E   (16)
         system function $H(S) = s+0.1/(s+0.1)2+9$ into a digital IIR filters.
         Select T=0.1 and compare the location of the zeros in H(Z) with the
         locations of the zeros obtained by applying the impulse invariant
         method in the conversion.

(b) The normalized transfer function of an analog filter is given by , CO4- E (16)
$H(S)=1/s^2+1.414s+1$ convert the analog filter into a digital IIR filters with cutoff frequency 0.4π, using Bilinear transformation and compare the location of the zeros in H(Z) with the locations of the zeros obtained by applying the impulse invariant method in the conversion.

13. (a) Design a linear phase FIR BPF to pass frequency in the range 0.35π CO3-Ana (16) to 0.48π rad/sample using a rectangular window, by taking 5 samples of window sequence. Analyze the above with a Hamming window and comment about the result.

<div align="center">Or</div>

(b) Design a band pass filter using frequency sampling method for the CO3-Ana (16) specifications,
Sampling frequency F= 8000Hz
Cutoff frequency fc_1 =1000 Hz
fc_2=3000 Hz
Determine the filter coefficients for N=7. If N=5 what will be the filter coefficients?

14. (a) For second-order IIR filter, $H(z) = 1 /(1-0.5z^{-1})(1-0.45z^{-1})$. Study the CO2- App (16) effect of shift in pole location with 3 bit coefficient representation in direct and cascade form.

<div align="center">Or</div>

(b) In the IIR system given below the products are rounded to 4-bits CO2- App (16) (including sign bit). $H(z) = 1 / (1-0.35z^{-1}) (1-0.62z^{-1})$. Find the output round off noise power in a)direct form realization b)cascade realization

15. (a) Draw the simplified architecture of the TMS320C6xx processor and CO1- U (16) explain in detail.

<div align="center">Or</div>

(b) List the addressing modes of the TMS320C6xx processor with CO1- U (16) relevant examples.

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