BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MTECH/PRE-PHD **SEMESTER : I/NA**
BRANCH: EEE **SESSION : MO/18**

SUBJECT: EE501 ADVANCED DIGITAL SIGNAL PROCESSING

TIME: 03:00 HRS. **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

Q.1(a) Analyze whether the following discrete time system can be considered as LTI system or not, with suitable mathematical proof. [5]
$y(n)=x(n^2)$

Q.1(b) Design for digital system using multi-rate DSP that utilizes both decimation and interpolation to have Dual-tone multifrequency (DTMF) signalling at 770Hz and at 1477Hz. [5]

Q.2(a) Derive DIT-FFT algorithm and draw the butterfly diagram. [5]

Q.2(b) Compute the 2 - point DFT X (k) using DIT-FFT algorithm of a length 2 sequence x(n)= {1,2}. Represent the steps of computation using butterfly diagram. [5]

Q.3(a) Derive the order of IIR Butterworth Filter using bilinear transformations when pass band gain Ap, pass band cut-off frequency Fp, stop band cut-off frequency Fs, stop band gain As and Sampling frequency F_{samp} are given. [5]

Q.3(b) Design a digital IIR Butterworth low pass filter using analog filter design technique that satisfies the following constraints. Use bilinear transformations. Ap=0.89, Fp=25 Hz, As=0.215, Fs= 75 Hz, Sampling frequency F_{samp} = 300 Hz. [5]

Q.4(a) What is Gibb's oscillation? What are the remedial measures? [5]

Q.4(b) Derive the condition for a FIR filter to be linear phase and check the condition for M=5. [5]

Q.5(a) Design of real-time DSP adopts integrated design environment (IDE). Elucidate the implementation of IDE in TMS 320 C 6X processor. [5]

Q.5(b) The TMS processor has CODEC. What is the basis for design of CODEC for converting analog to digital signal and vice versa. [5]

********28.11.18******M**