Reg. No: ……..

Name: ……..

Sixth Semester B.Tech Degree Model Examination,April 2016

(2013 Scheme)

13.606.2 (Elective II): ADAPTIVE SIGNAL PROCESSING (AT)

Time:3 Hours Max.Marks:100

PART-A

Answer **all** questions. **Each** question carries **2** marks.

1.Define an adaptive system.

2.Write a short note on system identification in Adaptive signal processing.

3.State the characteristics of Adaptive systems.

4.What do you mean by Rate of convergence and Stability?

5.What is the difference between Newton's method and Steepest descent method?

6.Explain (i)performance Penalty (ii) Learning Curve

7.Find the z-transform for each of the following sequences:

(a) $x(n) = 10 \sin(0.25\Pi n)u(n)$ (b) $x(n) = e^{-0.1n} \cos(0.25\Pi n)u(n)$

8. Differentiate between sequential regression algorithm and Random search algorithm.

9.Write a short note on adaptive filters to produce orthogonal signals. **(10 X 2 = 20 Marks)**

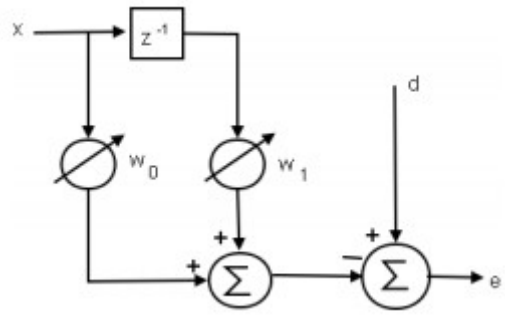
10.What is an Adaptive recursive filter ?

PART B

Answer **one full** question out of the two from **Each** Module. **Each** question carries **20** marks.

Module-I

11. Adaptive systems are non linear.Justify. Suppose in an adaptive-filtering environment, where input signal, $x_n = \sin(2\pi n/N)$ and Desired signal, $d_n = 2\cos(2\pi n/N)$ sampled sinusoids with same frequency and N samples per cycle (N > 2). Calculate R, P, ξ, W*, ξ_{min}



OR

12. Derive the expression for gradient and minimum Mean Square Error with 2 Dimensional Performance surface plots.

Module –II

13. Given a quadratic MSE function for the Wiener filter: $J = 40 – 20W + 10W^2$,Use the steepest descent method with an initial guess as w0 =0 and μ=0.04 to find the optimal solution for W*and determine ξ min by iterating three times.

OR

14. Deduce the mathematical expression of gradient search by Newton's method.

Module –III

15. Derive the Convergence of the weight vector of LMS Algorithm .

OR

16. Determine the Frequency response for the given transfer function. Sketch its Pole-Zero plot & -filter realisation.

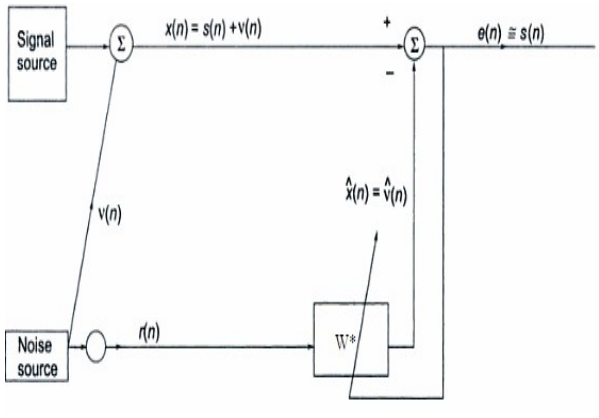
$$H(z)=\frac{0.27(z^2+1)}{z^2-1.27z+0.81}$$

Module –IV

17. Explain the technique of canceling the maternal ECG in fetal electrocardiography with neat diagram.

OR

18. Write a short note on adaptive noise cancelling.Consider the noise canceller Assume v (n) = C r(n).Determine the best value of W* that minimise mean square error E[e^2 (n)].



(4 X 20 =80 Marks)