Registration No: | | | | | | | | | | |

Total Number of Pages: 01 **B.Tech.**
PEEL5401

7th Semester Regular/Back Examination 2017-18
Adaptive Signal Processing
BRANCH : AEIE, BIOMED, ECE, EEE, EIE, ETC, IEE
Time: 3 Hours
Max Marks: 70
Q.CODE: B383
Answer Question No.1 which is compulsory and *any five* from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) What is adaptive in an adaptive filter? How is it done?
b) Draw the structure of an adaptive noise canceller. Discuss the significance of each signal.
c) List the steps of LMS algorithm for complex tap input and complex tap weight.
d) What is the difference between Newton method and Steepest descent method gradient search of performance?
e) What is a most commonly used model for a communication channel? Give its impulse response.
f) Write the normal form of input co-relation matrices.
g) Show that for a positive definite correlation matrix, its eigen values are always real.
h) Find optimum weight vector with N=30 for an ALC.
i) Explain the terms CDF and PDF.
j) What is linear dependency? When two random variables are said to be linearly independent?

Q2 **a)** With a neat diagram explain the basic difference between open-loop and closed-loop adaption. **(5)**
b) What is recursive and non-recursive adaptive filter? Explain the general form of a non-recursive adaptive filter. **(5)**

Q3 **a)** Derive Winner-Hopf equation for a filtering problem. **(5)**
b) Derive mean square error in canonical form for Winner filter. **(5)**

Q4 **a)** Explain Steepest descent method of gradient search of performance surface. **(5)**
b) Explain the geometrical significance of eigen values and eigen vectors. **(5)**

Q5 **a)** Derive the normalized LMS (NLMS) algorithm and state its advantage over the LMS. **(5)**
b) Explain the operation of adaptive equalizer? **(5)**

Q6 Define a vector space and list the axioms of real vector space. **(10)**

Q7 **a)** Explain adaptive noise cancellation by means of an adaptive filter. **(5)**
b) What are the parameters that are required for adaptive system identification? **(5)**

Q8 **Write short notes on any TWO of the following :** **(5 x 2)**

a) Single input single output noisy output plant model
b) Adaptive line enhancer
c) Learning curve