Paper Code: EE303	Roll No.										

B.TECH
(SEM-III) THEORY EXAMINATION 2016-17
BASIC SYSTEM ANALYSIS

[Time: 2hrs] **[Max. Marks: 50]**

Note- Attempt all questions.

Q1. Attempt any two questions. **14 marks**

a) For which types of systems state variable approach is used. What is state transition matrix and also write down the properties of state transition matrix. Write down the steps for doing controllability and observabillity test.
b) Find out the following
   (i) Transfer function, test for controllability and observability. Given that

$$\dot{X}=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}x+\begin{bmatrix}0\\ 1\end{bmatrix}u$$

$$Y=[1\ \ 0]x+[0]u$$

   (ii) Find state transition matrix and inverse of state transition matrix. Given that

$$A=\begin{bmatrix}0 & 1\\ -2 & -3\end{bmatrix}$$

c) Transfer function $Y(s)/U(s) = [1/s^4+5s^3+8s^2+6s+3]$ find matrix A and B

Q2. **Attempt any three** **12 marks**

a) Explain Fourier series with its classification and application.
b) Explain Fourier transform. State the properties of parsevals theorem and time differentiation in Fourier transform with proof.
c) What is Z-transform its types. And write a note on ROC (region of convergence) with properties of ROC.
d) Explain the given properties of Z-transform with proof.
   (i) Differentiation in Z-domain
   (ii) Linearity in Z-transform.
e) Write the statement of D'Alembert's principle with proof.

Q3 Attempt any two **12 marks**

a) Write a short note with applications and example on:- Delta function, linear and non-linear signal, Periodic and a periodic signal, causal and non- causal signal.
b) Find the Laplace inverse of $[1\div s(s+4)]$ using convolution integral.
c) Explain Dirichlet conditions in Fourier transform. And also find the Fourier transform of given function $x(t)= \cos\omega_c t\ u(t)$.

Q4 Attempt any two **12 marks**

a) Determine inverse Fourier transform of $X(j\omega)= [(2j\omega+1)\div(j\omega+2)^2]$ by partial fraction.
b) Determine inverse Laplace transform of the following with full method and steps.
   (i) $F(s)= [1\div s(s+1)]$
   (ii) $F(s) = [1\div(s-a)^2]$

c) Given the mechanical system in the figure. Obtain its electrical analogous using force voltage analogy.