



M 19283

Reg. No. :

Name :

**IV Semester B.Tech. (Reg./Sup./Imp. – including Part Time) Degree
Examination, June 2011
(2007 Admn.)**

PT2K6/2K6EC 403 : COMMUNICATION ENGINEERING – I

Time: 3 Hours

Max. Marks: 100

Instruction : Answer all questions.

1. a) For a random process $X(+)$ define :
 - i) Ergodic in mean
 - ii) Ergodic in autocorrelation function.
- b) Define :
 - i) Mean
 - ii) Variance
 - iii) n^{th} moment of a random variable X .
- c) Write a short note on thermal noise.
- d) A white Gaussian noise of zero mean and PSD $N_0/2$ is passed through a RC low pass filter. Determine the PSD of the noise $n(+)$ appearing at the filter output and plot the same.
- e) With the help of a block diagram and frequency spectrum, explain synchronous detection of DSBSC modulated wave.
- f) With the help of a neat block diagram, explain the working of a TRF receiver.
- g) Explain the generation PM wave by using frequency modulator
- h) Explain FM bandwidth computation using :
 - i) Carson's rule
 - ii) Universal curve method.

(8×5=40)

P.T.O.



2. a) State and prove Wiener – Khinchine – Einstein theorem. 10
 b) A random variable X has a pdf $f_X(x) = e^{-x} u(x)$. Another random variable Y is defined by $Y = X^3$. Determine pdf of y . 5
 OR
3. a) A Particular random voltage in a circuit is represented by a random variable V , having density function $f_V(v) = 0.4v e^{-v^2/5} u(v)$. This voltage is applied to a device whose output is $Y = V^2$. Determine the average value of Y . 7
 b) What is Gaussian process ? Explain any 3 properties of a Gaussian process. 8
4. a) White Gaussian noise of zero mean and PSD $N_0/2$, is passed through a High - Q- tuned filter (practical RLC BPF) with center frequency f_0 with necessary equations, explain and plot the PSD of the filtered noise $n(t)$ and PSD of its inphase and quadrature components. 11
 b) Write a short note on representation of narrow band noise interms of its envelop and phase components. 4
 OR
5. Obtain the expression for overall noise figure and overall equivalent noise temperature of the cascaded connection of n no. of 2 port networks. 15
6. a) Show that the figure of merit of a DSBSC receiver using coherent detector is unity. Sketch necessary PSDs. 12
 b) Show that for a single tone AM max. efficiency η_{\max} is 33.33% at $\mu = 1$. 3
 OR
7. a) Derive the time domain expression for the SSB wave containing only the lower side band. Sketch necessary spectrums. 10
 b) Explain the frequency discriminator method of generating SSB wave. 5
8. a) Explain pre-emphasis and de-emphasis used in FM and obtain the expression for improvement factor. 10
 b) Write a short note on FM threshold effects. 5
 OR
9. a) Derive and plot the frequency spectrum of a single tone wide band FM wave. 10
 b) Explain direct method of generating FM wave. 5
-



M 19284

Reg. No. :

Name :

IV Semester B.Tech. (Reg./Sup./Imp. including Part Time) Degree
Examination, June 2011
(2007 Admn.)

PT2K6 / 2K6EC / AEI 404 : SIGNALS AND SYSTEMS

Time: 3 Hours

Max. Marks: 100

Instruction : Answer all questions.

- I. a) Name and explain different elementary signals.
b) How do you define invertibility property of a continuous time system ?
Give an example.
c) Explain correlation theory of deterministic signals.
d) Explain Hilbert transform.
e) State and explain Laplace transform of continuous time signals.
f) Explain how frequency domain representation of discrete time non periodic signal is obtained.
g) Explain time shift property of z-transform.
h) What is ROC ? Explain. (8×5=40)
- II. a) Find even and odd part of the following signals :
i) $x(t) = e^{-t}u(t)$ 7
 $x(t) = [\sin(\pi t) + \cos(\pi t)]^2$
b) A system is described by the following input output relationship
 $y[n] = x[n - n_0]$. Check for the following system properties.
i) Stability
ii) Causality
iii) Linearity
iv) Time invariance. 8

OR

P.T.O.



c) Convolute the two continuous time signals $x_1(t) = \cos 2\pi t [u(t+1) - u(t-3)]$ and $x_2(t) = u(t)$. 8

d) A second order LTI system is described by the following difference equation $y[n] = \frac{3}{4}y[n-1] - \frac{1}{8}y[n-2] + x[n] - x[n-1]$. Find the impulse response of the system. 7

III. a) Prove the following properties of Fourier series

i) Time shift property ii) Parseval's theorem. 8

b) Write a note on Hilbert transform. 7

OR

c) Find the Fourier transform of the signal $x(t) = te^{-2t} u(t)$. Draw the magnitude and phase spectra. 8

d) Explain the terms energy spectral density and power spectral density. 7

IV. a) Find the DTFT of an unit step sequence. 8

b) Consider a discrete LTI system is described by $y[n] - \frac{1}{2}y[n-1] = x[n] + \frac{1}{2}x[n-1]$.

Find the frequency response of the system. 7

OR

c) Find DTFT representation of the sequence $x[n] = \cos^2\left(\frac{\pi}{8}\right)^n$. 8

d) Explain the method of determining frequency response from poles and zeros. 7

V. a) State and prove initial value and final value theorems. 10

b) Find z-transform of the ramp sequence. 5

OR

c) Explain the properties of ROC. 7

d) Using the long division method, find the first 4 terms of the sequence $x[n]$ if

$$x(z) = \frac{z}{3z^2 - 4z + 1} \text{ when ROC is}$$

i) $|z| > 1$ ii) $|z| < \frac{1}{3}$. 8



M 19285

Reg. No. :

Name :

IV Semester B.Tech. (Reg./Sup./Imp. including Part Time) Degree
Examination, June 2011
(2007 Admn.)

PT2K6/2K6EC/AEI405 : ELECTRONIC CIRCUITS

Time: 3 Hours

Max. Marks : 100

Instruction : Answer all questions.

1. a) Write the switching characteristics of BJT with capacitive load.
b) What are the differences between MOS and CMOS inverter ?
c) Enumerate the differences between astable and monostable multivibrators.
d) Write the schematic of 555 IC timer.
e) What is the significance of phase detectors ?
f) Write the circuit diagram of bootstrap configura.....
g) What is charge scaling ?
h) What is the significance of flash converter ? (5×8=40)
2. Explain RC circuit as integrator and as differentiator with neat sketches. Bring out the differences between the two. 15

OR
3. With a switching characteristics of a MOS inverter, explain resistive and active load configurations. 15
4. With a circuit diagram, explain collector coupled and emitter coupled monoshot. Bring out the differences between the two. 15

OR
5. Explain the astable, monostable operations using negative resistance devices. What are the differences ? 15

P.T.O.



Reg. No. :

Name :

**IV Semester B.Tech. (Reg./Sup./Imp. including Part Time) Degree
Examination, June 2011
(2007 Admn.)**

PT2K6/2K6EC406 : DIGITAL ELECTRONICS

Time: 3 Hours

Max. Marks : 100

Instruction : Answer all the questions.

PART – A

1. a) What is boolean algebra ? Explain the types of boolean expressions with an example in each case.
- b) Define digital circuits. What are its applications ?
- c) Explain the hazards in combinational circuits.
- d) Explain T-flipflop with logic diagram and truth table.
- e) Explain a general model of sequential network.
- f) Define synchroniser failure and metastability.
- g) Explain basic features of IIL logic families.
- h) Discuss TTL transfer characteristics. (8×5=40)

PART – B

2. a) i) Perform the followings : 1
 - I) $(101101.10101)_2 \rightarrow (?)_{10}$
 - II) $48_{10} - 23_{10} \rightarrow (?)_2$

Convert the numbers into binary and subtract using 2's compliment method. 4
- ii) For a 4-variable K map $f = \sum m (1, 3, 4, 5, 10, 12, 13)$. Draw the K-map and write the simplified expression. 10

OR

P.T.O.



- b) i) What is multiplexer ? Derive logic diagram for 8: 1 multiplexer. 8
 ii) What is decoder ? Derive logic diagram for 4 to 10 line decoder. 7
3. a) i) What is full subtractor ? Design a full subtractor and write the logic diagram. 8
 ii) Explain carry look-ahead adder with a block diagram. 7
- OR
- b) i) Explain the Ring counter with truth table and logic diagram. 7
 ii) Discuss with block diagram, the various operations of a shift registers. 8
4. a) i) Explain the synchronise design method of sequential networks. 8
 ii) Explain :
 I) Excitation table
 II) State diagram
 with an example in each case. 7
- OR
- b) Design a synchronous mod-6 counter using clocked JK-flipflops. Write the excitation table. Deduce the expressions and write the logic diagram and waveforms. 15
5. a) i) Explain Transistor-Transistor logic NAND gate. 7
 ii) Discuss the input and output characteristics of TTL gate. 8
- OR
- b) i) With a neat circuit explain a MOS inverter. 7
 ii) Explain the method of interfacing BJT and CMOS gates. 8
-