M 23172

Reg. No. : ....

Name : ....

IV Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013 (2007 Admn. Onwards)
PT 2K6/2K6 CE/ME/EE/EC/CS/IT/AEI 401 : ENGINEERING MATHEMATICS – III

Time: 3 Hours Max. Marks : 100

Instruction : *Answer **all** questions.*

1. a) If $f(z) = u + iv$ is analytic in a region R, prove that u and v are harmonic in R, if they have continuous partial derivatives in R. **5**

   b) State and prove the necessary condition for a function to be analytic. **5**

   c) If $f(z)$ is analytic in a region R and if C_1 and C_2 are any two paths in R joining two points z_0 and z_1 in R and having no other common points, then show that $\int_{C_1} f(z)\,dz = \int_{C_2} f(z)\,dz$. **5**

   d) Explain with examples :

      1) Isolated singularity 2) Removable singularity. **5**

   e) Fit a straight line to the following data by this method of least squares.

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

5

   f) If $\sigma_X \neq 0$, show that $\rho(X, X) = 1$ and $\rho(-X, X) = -1$. **5**

   g) Classify the equation $x^2 \dfrac{\partial^2 u}{\partial x^2} + (1 - y^2)\dfrac{\partial^2 u}{\partial y^2} = \theta; -\infty < x < \infty$ and $-1 < y < 1$. **5**

   h) Using D'Alembert's method find the deflection of a vibrating string of unit length having fixed ends with initial velocity zero and initial deflection, $f(x) = a(x - x^3)$. **5**

P.T.O.

2. a) i) Constant the analytic function f(z) = u + iv, if $u = \frac{1}{2}\log(x^2 + y^2)$ by Milne Thompson method. **8**

ii) Find the image of the circle $|z - 2i| = 2$ under the map w = 2z. **7**

OR

b) i) If u + iv is analytic, prove that $\left[\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right]|f(z)|^2 = 4|f'(z)|^2$. **7**

ii) Explain :

i) Translation

ii) Rotation and magnification

iii) Inversion and reflection. **8**

3. a) i) State and prove Cauchy's Residue Theorem. **6**

ii) Evaluate $\int_C \frac{4 - 3z}{z(z-1)(z+2)} dz$ where C is $|z| = 3/2$ using Cauchy's Residue Theorem. **9**

OR

b) i) Find $\int_0^\infty \frac{dx}{(1+x^2)^2}$. **8**

ii) Expand in Laurent's series, $f(z) = \frac{z^2 - 1}{(z+2)(z+3)}$, $2 < |z| < 3$. **7**

4. a) i) The following data gives the rainfall and discharge in a certain river. Obtain the line of regression of y on x. **8**

Rainfall x (cm)	1.53	1.78	2.60	2.95	3.42
Discharge y (1000 cc)	33.5	36.3	40.0	45.8	53.5

ii) The joint probability distribution of two random variables X and Y is given by $f(x, y) = \frac{3y + x}{24}$, x = 1, 2 ; y = 1, 2. Find

a) The marginal distributions

b) Cov(X, Y)

c) $\rho(X, Y)$. **7**

OR

b) i) The joint probability distribution of two discrete random variables X and Y is given by $f(x, y) = \begin{cases} kxy; & x = 1, 2, 3 ; y = 1, 2, 3 \\ 0 ; & \text{otherwise} \end{cases}$. Find

a) k

b) $P[1 \leq X \leq 2, Y \leq 2]$

c) $P[Y < 2]$

d) $P[X = 1]$. **8**

ii) A club basket ball team will play a 44 game season. 26 of these games are against class A teams + 18 are against class B teams. Suppose that the team will win each game against a class A team with probability 0.4 and will win each game against a class B team with probability 0.7. Assume also that the results from the different games are independent. Approximate the probability that

a) The team wins 25 games or more

b) The team wins more games against class A teams than it does against class B teams. **7**

5. a) i) Derive this 1-dimensional heat equation. **5**

ii) A string of length l has its ends fixed. The mid point is taken to a small height h and released from rest at time t = 0. Find the displacement function y(x, t). **10**

OR

b) An infinitely long metal plate of width 1 with insulated surfaces has its temperature zero along both the edges y = 0 and y = 1 at infinity. If the edge x = 0 is kept at fixed temperature. To, find the temperature T at any point (x, y) of the plate in steady state. **15**

M 23182

Reg. No. : ....

Name : ....

IV Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT2K6/2K6 EE/EC/AEI 402 : COMPUTER PROGRAMMING

Time: 3 Hours Max. Marks : 100

Instruction : *Answer **all** questions.*

I. a) Write notes syntax rules and comments in C programming with suitable examples. **(8×5=40)**

b) Write a program that prints a table of trigonometric values for sin( ), cos( ) and tan( ). The angles in your table should go from 0 to 2π in 20 steps.

c) Write notes on the relationship between arrays and pointers with suitable examples.

d) Write notes on dynamic memory allocation with suitable examples.

e) Write notes on the different data types in java with suitable examples.

f) Write notes on constructors in java with suitable examples.

g) Write notes on strings and the most commonly used string methods in java with suitable examples.

h) Write notes on the byte streams with suitable examples.

II. a) Write notes on the different types of statements available in C with suitable example demonstration for each. **15**

OR

b) Write a C program to generate random numbers using functions. Don't use the rand( ) function which is in the standard library. **15**

III. a) Explain in detail the different string related operations and the string handling functions with suitable example programs to demonstrate each of them. **15**

OR

b) Explain in detail about the self referential structures and with the help of a program explain how the different types of linked lists are implemented. **15**

P.T.O.

IV. a) Explain in detail with suitable examples on how decision making is done with branching control structures in java. **15**

OR

b) Write the help of a good programming example, explain in detail the polymorphism and the overriding methods. **15**

V. a) With notes on single and multi dimensional arrays. An election is contested by 5 candidates. The candidates are numbered 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a java program to read the ballots and count the number of votes casted for each candidate using an array variable 'count'. In case a number read is outside the range 1 to 5, the ballot should be considered as a 'spoilt ballot" and the program should count the number of spoilt ballot. **15**

OR

b) Explain in detail the different file related operations in java with suitable example programs. **15**

M 23187

Reg. No. : ....

Name : ....

IV Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT 2K6/2K6 EC 403 : COMMUNICATION ENGINEERING – I

Time: 3 Hours Max. Marks: 100

***Instruction :** Answer **all** questions.*

1. a) Define Gaussian process and state its properties.
   b) What is stationarity ? State the conditions for stationarity.
   c) What is meant by noise equivalent bandwidth ? Explain.
   d) Write short notes on Shot noise and Flicker noise.
   e) Compare SSB transmission with VSB transmission.
   f) Explain what is meant by selectivity of a receiver.
   g) Define modulation index for FM.
   h) Explain what are the drawbacks of direct method for FM generation. **(8×5=40)**

2. a) Explain the response of LTI system to random process. $7^1/_2$
   b) Explain conditional PDF and its properties. $7^1/_2$

OR

3. a) Explain when is a random process said to be ergodic in mean. **6**
   b) The PDF of a random variable is given as $f_X(x) = ke^{-bx}$ for $x \geq 0$

   $= 0$ for $x < 0$ and $k, b > 0$

   find the values of k in terms of b. **9**

4. a) Explain what is meant by thermal noise . **6**
   b) Derive an expression for power spectral density of thermal noise. **9**

OR

5. With supporting equations, compare the characteristics of all sources of noise. **15**

6. a) Define modulation index. Explain the significance of modulation index. 6

   b) Broadly distinguish SSBSC from DSDSC. 9

OR

7. Draw a neat circuit diagram and block diagram of an AM transmitter and explain its principle of operation. 15

8. a) Explain what is meant by pre-emphasis and de-emphasis. 6

   b) Draw a schematic diagram of FM slope detector and explain its operation. Why is this method not often used in practice ? 9

OR

9. a) What is threshold effect ? 5

   b) Draw a neat block diagram of FM transmitter and explain its principle of operation. 10

M 23188

Reg. No. : ....

Name : ....

IV Semester B.Tech. Degree (Reg./Sup./Imp.– Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT2K6/2K6EC/AEI 404 : SIGNALS AND SYSTEMS

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** questions.*

PART – A

Answer **all** questions.

I. a) What is the difference between a deterministic signal and a random signal ? Explain with an example.

b) Check whether the following system is linear or not ? Prove it ?

$$y(n) = \frac{x(n-5) + x(n-7)}{x(n-2)\,x(n-3)}$$

c) State and prove the frequency shifting property of CTFT.

d) Explain the ideal reconstruction of original signal from the samples.

e) Find the DTFT of $x(n) = \left(\frac{1}{3}\right)^n u(n)$.

f) Explain an inverse system.

g) State and prove the initial value theorem of Z-transform.

h) Prove any 2 properties of the Z-transform. **(8×5=40)**

PART – B

II. a) Perform convolution of x (n) and h (n) where $x(n) = \{1, \underset{\uparrow}{2}, 3, 4\}$ and $h(n) = \{\underset{\uparrow}{2}, 3, 1, 1\}$. **6**

b) Find the output response of the system described by the differential eqn.

$$\frac{d^2y(t)}{dt^2} + 7\frac{dy(t)}{dt} + 12y(t) = \frac{dx(t)}{dt} + x(t)$$

where $x(t) = u(t)$, and the initial conditions are $y(0^+) = 1$; $\frac{dy(0^+)}{dt} = 1$. **9**

OR

c) The impulse response $h(t) = \begin{cases} 4(t) & 0 \le t \le T \\ 0 & \text{otherwise} \end{cases}$. The input signal $x(t) = e^{-at}u(t)$.

Find the o/p of the system y(t) for

i) $t < 0$,

ii) $0 < t < T$,

iii) $t > T$. **10**

d) Discuss any three classification of signals with an example. **5**

III. a) Find the Fourier transform of

$$x(t) = \begin{cases} 1 & 0 \le t \le 1 \\ -1 & -1 \le t \le 0 \\ 0 & \text{otherwise} \end{cases}$$ **7**

b) State and prove the convolution and multiplication property of CTFT. **8**

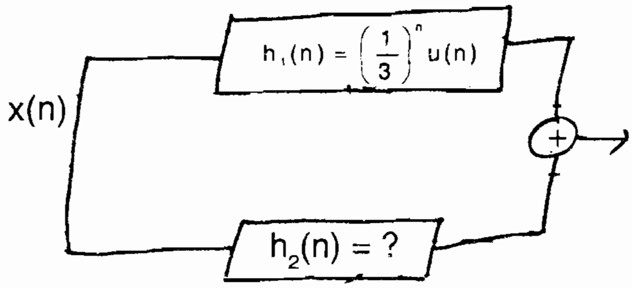
OR

c) Using the property find out the Fourier transform of the signal

$$x(t) = \frac{d}{dt}\left\{\left[e^{-2t}u(t)\right] * \left[e^{-3t}u(t-3)\right]\right\}.$$ **9**

d) Prove the Parseval's theorem for CTFS. **6**

IV. a) Determine h_2 (n) for the given system. **15**



$$H\left(e^{j\Omega}\right) = \frac{-12 + 5e^{-j\Omega}}{12 - 7e^{-j\Omega} + e^{-j2\Omega}}$$

OR

b) Find the DTFT of signal

$$x(n) = \begin{cases} \left(\frac{1}{2}\right)^n & n \geq 0 \\ \left(\frac{1}{3}\right)^n & n < 0 \end{cases}$$ **7**

c) Determine the step response of a continuous time LTI system described by the differential equation using Laplace transform

$$\frac{d^2y(t)}{dt^2} + 5\frac{dy(t)}{dt} + 6y(t) = x(t).$$ **8**

V. a) Using the property find out the Z-transform of the signal for | a | < 1 and also the ROC $x(n) = n\,a^n\,u(n)$. **10**

b) What is ROC of Z-transform ? Explain. **5**

OR

c) Determine the poles and zeros for the given differential equation. Also find out ROC

$$y(n) - \frac{5}{6}y(n-1) + \frac{1}{6}y(n-2) = x(n) - x(n-1).$$ **8**

d) Find out the Z-transform of the signal

$$x(n) = \left(\frac{1}{5}\right)^n u(n) + \left(\frac{1}{8}\right)^n u(n).$$ **7**

M 23189

Reg. No. : ....

Name : ....

Fourth Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT 2K6/2K6 EC/AEI 405 : ELECTRONIC CIRCUITS – II

Time: 3 Hours Max. Marks : 100

PART – A

Answer **all** questions.

1. a) Draw and explain transistor switch with output waveforms. **5**
   b) Explain the principle of pulse transformer. **5**
   c) Design a astable multivibrator with equal ON-OFF period using IC 555. **5**
   d) Explain the concept of collector coupled monoshot. **5**
   e) Explain lock range and capture range in PLL. **5**
   f) Explain one application of PLL. **5**
   g) Explain the following terms :
      i) Accuracy
      ii) Resolution. **5**
   h) Explain the principle of binary weighted DAC. **5**

PART – B

2. a) Construct a RC integrator and explain. **7**
   b) Construct a differentiator with RC circuit and explain. **8**

OR

3. Draw the circuit of CMOS inverter and explain the operation. Also discuss the dynamic power dissipation. **15**

P.T.O.

4. Explain astable and bistable operations using a current controlled negative resistance device. **15**

OR

5. Draw and explain collector coupled astable multivibrator with necessary waveforms. **15**

6. Explain the concepts of voltage and current time base generators. **15**

OR

7. Draw a current starved VCO and explain its operation. What are its limitations ? **15**

8. Explain the operation of cyclic and pipeline DACs. **15**

OR

9. Explain the successive approximation ADC with an example. **15**

M 23190

Reg. No. : ....

Name : ....

IV Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT2K6/2K6EC 406 : DIGITAL ELECTRONICS

Time: 3 Hours Max. Marks: 100

Instruction : *Answer **all** questions.*

PART – A

1. a) If $(982)_{10} = (1726)_x$, what is x ?

   b) Implement f(A, B, C) = $\sum$0, 1, 3, 4, 7 using 4 to 1 MUX.

   c) What is static-1 hazard ?

   d) Prove that a full adder is equal to the sum of two half adders.

   e) What is a Moore machine ?

   f) What is a state diagram ? How do you draw a state diagram for a given circuit.

   g) What are the advantages of CMOS gates.

   h) Compare TTL, CMOS and ECL logic families with respect to their applications.

(8×5=40)

PART – B

2. a) Construct 3 × 1 MUX using 2 × 1 Muxes. **15**

   OR

   b) Simplify P = π (0, 1, 2, 3, 8, 9, 10, 13, 15) using k-map and implement the circuit using logic gates. **15**

3. a) Draw the circuit of JK master slave flip flop and explain its mode of operation. **15**

OR

b) Draw the circuit of a Mod-5 asynchronous counter. Explain its operation with the timing diagram. **15**

4. a) What is clock skew ? Briefly describe the different methods that are used to avoid clock skew in a circuit. **15**

OR

b) What is a state table ? How do you design a circuit when a state table is given. **15**

5. a) Briefly describe the characteristics of RTL families. **15**

OR

b) Briefly describe the characteristics of DTL families. **15**