CBCS SCHEME

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Complex Analysis, Probability and Statistical Methods

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Show that $f(z) = \sin z$ is analytic and hence find $f'(z)$. **(06 Marks)**
   b. Derive Cauchy Riemann equation in polar form. **(07 Marks)**
   c. If f(z) is analytic, prove that $\left(\dfrac{\partial}{\partial x}|f(z)|\right)^2 + \left(\dfrac{\partial}{\partial y}|f(z)|\right)^2 = |f'(z)|^2$. **(07 Marks)**

OR

2 a. Find the analytic function whose imaginary part is $e^x(x\sin y + y\cos y)$. **(06 Marks)**
   b. Show that $u = \sin x \cosh y + 2\cos x \sinh y + x^2 - y^2 + 4xy$ is harmonic. Also determine the analytic function f(z). **(07 Marks)**
   c. Derive Cauchy Riemann equation in Cartesian form. **(07 Marks)**

Module-2

3 a. State and prove Cauchy's integral formula. **(06 Marks)**
   b. Discuss the transformation $\omega = z^2$ **(07 Marks)**
   c. Find the bilinear transformation which maps the points $z = \infty, i, 0$ into $\omega = -1, -i, 1$. Also find the fixed points of the transformation. **(07 Marks)**

OR

4 a. Evaluate $\int_C |z|^2 dz$ where C is the square with vertices (0, 0), (1, 0), (1, 1), (0, 1). **(06 Marks)**
   b. Evaluate $\int_C \dfrac{e^{2z}}{(z+1)(z-2)}$ where C is the circle $|z| = 3$. **(07 Marks)**
   c. Find the bilinear transformation which map the points $Z_1 = i$, $Z_2 = 1$, $Z_3 = -1$ onto the points $\omega_1 = 1$, $\omega_2 = 0$, $\omega_3 = \infty$. **(07 Marks)**

Module-3

5 a. The probability distribution of a random variable X is given by the following table:

x	0	1	2	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2+K$

   (i)   Find K
   (ii) Evaluate P(X < 6) and P(3 < x ≤ 6) **(06 Marks)**
   b. The number of telephone lines busy at an instant of time is a binomial variate with probability 0.1 that a line is busy. If 10 lines are chosen at random, what is the probability that, (i) no line is busy   (ii) all lines are busy   (iii) at least one line is busy
   (iv) Atmost 2 lines are busy. **(07 Marks)**

c. In a certain town the duration of a shower is exponentially distributed with mean 5 minutes. What is the probability that a shower will last for :
   (i)   10 minutes or more
   (ii)   Less than 10 minutes.
   (iii)   Between 10 and 12 minutes   (07 Marks)

OR

6 a. The probability density function of a random variable is,

$$P(x) = \begin{cases} Kx^2, & -3 \le x \le 3 \\ 0, & \text{Otherwise} \end{cases}$$

   Find (i) K   (ii) $P(1 \le x \le 2)$ (iii) $P(x \le 2)$ (06 Marks)

   b. The probability that a news reader commits no mistake in reading the news is $\frac{1}{e^3}$. Find the probability that on a particular news broadcast he commits (i) Only 2 mistakes (ii) more than 3 mistakes   (iii) atmost 3 mistakes, assuming that mistakes follow Poisson distribution.   (07 Marks)

   c. The marks of 1000 students in an examination follows a normal distribution with mean 70 and standard deviation 5. Find the number of students whose marks will be, (i) less than 65, (ii) more than 75   (iii) between 65 and 75. (Given $\phi(1) = 0.3413$)   (07 Marks)

Module-4

7 a. The ranking of 10 students in two subjects, Field theory (A) and Network Analysis (B) are given below:

Roll No. of the students	1	2	3	4	5	6	7	8	9	10
A	3	5	8	4	7	10	2	1	6	9
B	6	4	9	8	1	2	3	10	5	7

   Calculate the Rank correlation coefficient.   (06 Marks)

   b. Fit a parabola $y = a + bx + cx^2$ for the data.

x	0	1	2	3	4
y	1	1.8	1.3	2.5	2.3

                                                                                   (07 Marks)

   c. In a partially destroyed Laboratory record of an analysis. The lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y - 107 = 0$. Calculate $\bar{x}, \bar{y}$ and coefficient of correlation between x and y.   (07 Marks)

OR

8 a. If θ is the angle between the two regression lines, show that

$$\tan\theta = \frac{1 - r^2}{r} \cdot \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2}$$
                                                                                   (06 Marks)

   b. Fit a straight line in the least square sense for the following data:

x	50	70	100	120
y	12	15	21	25

                                                                                   (07 Marks)

   c. Find the coefficient of correlation for the data.

x	10	14	18	22	26	30
y	18	12	24	6	30	36

                                                                                   (07 Marks)

Module-5

9 a. Determine (i) Marginal distribution (ii) Covariance between the discrete random variables X and Y along with the joint probability distribution.

X \ Y	1	3	9
2	$\frac{1}{8}$	$\frac{1}{24}$	$\frac{1}{12}$
4	$\frac{1}{4}$	$\frac{1}{4}$	0
6	$\frac{1}{8}$	$\frac{1}{24}$	$\frac{1}{12}$

(06 Marks)

b. In 324 throws of a six faced 'die', an odd number turned up 181 times. Is it possible to think that the 'die' is an unbiased one? **(07 Marks)**

c. A random sample of 10 boys had the following:
I.Q : 70, 120, 110, 101, 88, 83, 95, 98, 107, 100
Does the data support the assumption of a population mean I.Q of 100 at 5% level of significance?
$\left(\text{Note}: t_{0.05} = 2.262 \text{ for } 9 \text{ d.f}\right)$ **(07 Marks)**

OR

10 a. Explain the terms : (i) Null hypothesis (ii) Confidence intervals (iii) Type I and II errors **(06 Marks)**

b. The joint probability of the random variable X and Y as follows :

X \ Y	− 4	2	7
1	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
5	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$

Compute :
(i) $E(X)$ and $E(Y)$
(ii) $E(XY)$
(iii) σ_X and σ_Y
(iv) $COV(X, Y)$ **(07 Marks)**

c. Fit a Poisson distribution for the data and test the goodness of fit given that $\chi^2_{0.05} = 7.815$ for 3 d.f

x	0	1	2	3	4
f	122	60	15	2	1

(07 Marks)

* * * * *

USN | | | | | | | | | | 18MATDIP41

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Additional Mathematics – II

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1   a.   Find the rank of the matrix

$$A = \begin{bmatrix} 2 & -1 & -3 & -1 \\ 1 & 2 & 3 & -1 \\ 1 & 0 & 1 & 1 \\ 0 & 1 & 1 & -1 \end{bmatrix}$$ by applying elementary row transformations.   **(06 Marks)**

   b.   Solve the following system of equations using Gauss elimination method :
        $x - 2y + 3z = 2$, $3x - y + 4z = 4$ and $2x + y - 2z = 5$.   **(07 Marks)**

   c.   Find the eigen values of

$$A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$$ and also the corresponding eigen vectors.   **(07 Marks)**

OR

2   a.   Find the rank of the matrix by reducing if to echelon form

$$A = \begin{bmatrix} 1 & 2 & 2 & 4 \\ 2 & 3 & 4 & 6 \\ 3 & 5 & 6 & 10 \\ 4 & -1 & -3 & 2 \end{bmatrix}$$ **(06 Marks)**

   b.   Test for consistency and solve $5x + 3y + 7z = 4$, $3x + 26y + 2z = 9$, $7x + 2y + 10z = 5$.   **(07 Marks)**

   c.   Solve the following system of equations by Gauss elimination method :
        $x + 2y + z = 3$, $2x + 3y + 3z = 10$, $3x - y + 2z = 13$.   **(07 Marks)**

Module-2

3   a.   Find the interpolating polynomial for the following values.

x	0	1	2	3
f(x)	1	2	1	10

And hence evaluate f(4).   **(06 Marks)**

   b.   The Newton- Raphson method to find a real root of the equation
        $x^3 + x^2 + 3x + 4 = 0$ by performing two iterations.   **(07 Marks)**

   c.   Evaluate $\int_0^1 \frac{x \, dx}{1 + x^2}$ by Weddle's rule taking seven ordinates.   **(07 Marks)**

OR

4 a. Using Newton's interpolation formula find y(1.4) given

X	1	2	3	4	5
Y	10	26	58	112	194

(06 Marks)

   b. Find the real root of the equation $\cos x = 3x - 1$ correct upto three decimal using Regula Falsi method. (07 Marks)

   c. Evaluate $\int_0^1 \dfrac{dx}{1+x^2}$ by using Simpson's $1/3^{rd}$ rule taking four equal strips. (07 Marks)

Module-3

5 a. Solve $D^3 y + 6D^2 y + 11Dy + 6y = 0$. (06 Marks)

   b. Solve $\dfrac{d^2 y}{dx^2} - 4y = \cosh(2x - 1) + 3^x$ (07 Marks)

   c. Solve $y'' + 3y' + 2y = 12x^2$ (07 Marks)

OR

6 a. Solve $D^3 y - 2D^2 y + 4Dy - 8y = 0$. (06 Marks)

   b. Solve $y'' + 4y' - 12y = e^{2x} - 3\sin 2x$ (07 Marks)

   c. Solve $\dfrac{d^3 y}{dx^3} + \dfrac{d^2 y}{dx^2} + 4\dfrac{dy}{dx} + 4y = x^2 - 4x - 6$. (07 Marks)

Module-4

7 a. Form the PDE by eliminating the arbitrary constants $z = a\log(x^2 + y^2) + b$. (06 Marks)

   b. Solve $\dfrac{\partial^3 z}{\partial x^2 \partial y} = \cos(2x + 3y)$ (07 Marks)

   c. Solve $\dfrac{\partial^2 z}{\partial x^2} + z = 0$, given that when $x = 0$, $z = e^y$ and $\dfrac{\partial z}{\partial x} = 1$. (07 Marks)

OR

8 a. Form the PDE by eliminating the arbitrary function $f\left(\dfrac{xy}{z}, z\right) = 0$. (06 Marks)

   b. Solve $\dfrac{\partial^2 u}{\partial x^2} = x + y$. (07 Marks)

   c. Solve $\dfrac{\partial^2 z}{\partial y^2} = z$, given the when $y = 0$, $z = e^x$ and $\dfrac{\partial z}{\partial y} = e^{-x}$. (07 Marks)

Module-5

9 a. If A and B are any two events of S which are not mutually exclusive then prove that
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$
(06 Marks)

b. Define conditional probability. Given for the events A and B, $P(A) = \dfrac{3}{4}$, $P(B) = 1/5$,
$P(A \cap B) = \dfrac{1}{20}$, find $P\left(\dfrac{A}{B}\right)$, $P\left(\dfrac{B}{A}\right)$, $P\left(\dfrac{\overline{A}}{\overline{B}}\right)$, $P\left(\dfrac{\overline{B}}{\overline{A}}\right)$
(07 Marks)

c. Three machines M_1, M_2 and M_3 produce identical items of their respective output 5%, 4% and 3% of items are faulty, on a certain day, M_1 has produced 25% of the total output, M_2 has produced 30% and M_3 the remainder. An item selected at random is found to be faulty. What are the chances that it was produced by M_3?
(07 Marks)

OR

10 a. A bag contains 8 white and 6 red balls. Find the probability of drawing two balls of the same colour.
(06 Marks)

b. State and prove Baye's theorem.
(07 Marks)

c. If a pair of dice is thrown what is the probability that
   i)   The sum of numbers is divisible by 4
   ii) The number on the first is greater than that on the second.
(07 Marks)

* * * * *

USN | | | | | | | | | | 　　　　　　　　　　　　　　　　　　　　18CS42

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Design and Analysis of Algorithms

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1　a.　Explain the notion of algorithm. Design Euclid's algorithm for computing GCD (m, n). Find GCD (60, 24) using Euclid's algorithm. **(08 Marks)**

　　b.　If $t_1(n) \in O(g_1(n))$ and $t_2(n) \in O(g_2(n))$, then prove that $t_1(n) + t_2(n) \in O(\max(g_1(n), g_2(n)))$. **(08 Marks)**

　　c.　Distinguish between the two common ways to represent a graph. **(04 Marks)**

OR

2　a.　Write an algorithm to find maximum of n elements and obtain its time complexity. **(08 Marks)**

　　b.　Explain general plan of mathematical analysis of recursive algorithms with example. **(08 Marks)**

　　c.　Explain the any four important problem types. **(04 Marks)**

Module-2

3　a.　Write merge sort algorithm with example also calculate the efficiency. **(12 Marks)**

　　b.　Discuss Strassen's matrix multiplication. **(08 Marks)**

OR

4　a.　Write Quick sort algorithm with example. Also calculate the efficiency. **(12 Marks)**

　　b.　Discuss topological sorting. **(08 Marks)**

Module-3

5　a.　Explain Greedy Knapsack problem with example. **(06 Marks)**

　　b.　Write an algorithm for minimum spanning tree using Kruskal's. **(08 Marks)**

　　c.　Explain Heap sort technique. **(06 Marks)**

OR

6　a.　Explain Coin change problem with example. **(06 Marks)**

　　b.　Write an algorithm for minimum spanning tree using Prim's. **(08 Marks)**

　　c.　Explain Huffman coding concept. **(06 Marks)**

Module-4

7　a.　Explain transitive closure of a directed graph and find the transitive closure for the given graph.
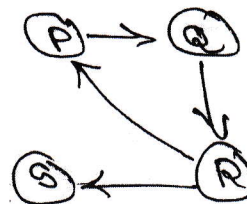

Fig Q7(a)　　　　　　　　　　　　　　　　　　　　　**(10 Marks)**

b. Construct the optimal binary search tree for the following data :

Key	A	B	C	D
Probability	0.1	0.2	0.4	0.3

(10 Marks)

OR

8 a. Solve the following travelling sales person problem using dynamic programming technique.
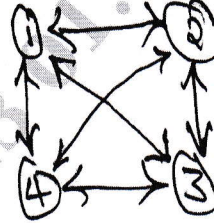

Fig Q8(a)   (10 Marks)

b. Consider the following instance to solve the Knapsack problem using dynamic programming.

Item	Weight	Value
1	2	$12
2	1	$ 10
3	3	$ 20
4	2	$ 15

W = 5

(10 Marks)

Module-5

9 a. Explain N-Queen problem with example.   (08 Marks)

b. Solve the following assignment problem using branch and bound technique.

$$C = \begin{bmatrix} 9 & 2 & 7 & 8 \\ 6 & 4 & 3 & 7 \\ 5 & 8 & 1 & 8 \\ 7 & 6 & 9 & 4 \end{bmatrix} \begin{matrix} \text{Person a} \\ \text{Person b} \\ \text{Person c} \\ \text{Person d} \end{matrix}$$

job1 job2 job3 job4

(12 Marks)

OR

10 a. Explain Hamiltonian cycles with example.   (08 Marks)

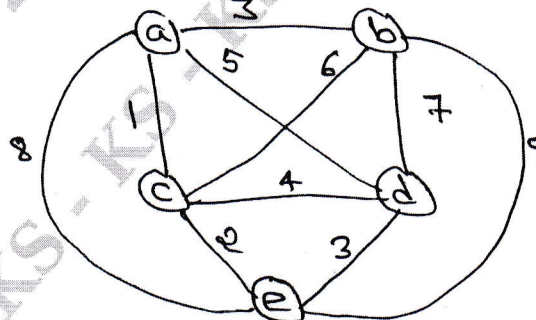b. Solve the travelling sales person problem using branch and bound technique.

Fig Q10(b)   (12 Marks)

* * * * *

USN | | | | | | | | | | |

18CS43

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Operating Systems

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1   a.   Define Operating System. Explain briefly multiprogramming and time sharing system.
         (08 Marks)
    b.   Explain various OS services.   **(05 Marks)**
    c.   What are system calls? Briefly explain types of system call.   **(07 Marks)**

OR

2   a.   With a neat diagram, explain the different state of process.   **(07 Marks)**
    b.   Explain scheduler in a process execution.   **(05 Marks)**
    c.   Explain direct and indirect communication with respect to message passing systems.
         (08 Marks)

Module-2

3   a.   Discuss multithreading models.   **(05 Marks)**
    b.   Discuss the benefits of multithreaded programming.   **(05 Marks)**
    c.   Consider the following set of four process with length of CPU burst given in MS:

Process	Burst time
P1	24
P2	3
P3	3

Compute the waiting time and avg. turnaround time for the above process using FCFS scheduling algorithm.   **(10 Marks)**

OR

4   a.   Explain requirements must satisfy to critical section problem.   **(04 Marks)**
    b.   Illustrate with an example Peterson's solution problem.   **(08 Marks)**
    c.   Explain syntax and schematic view of monitors.   **(08 Marks)**

Module-3

5   a.   What are necessary conditions for deadlock?   **(04 Marks)**
    b.   Explain different methods to recovery from deadlocks.   **(08 Marks)**
    c.   Consider the following snapshot of system:

Process	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

Find the need matrix and calculate safe sequence using bankers algorithm-mention the above is safe or not safe.   **(08 Marks)**

OR

6 a. What is paging hardware with TLB? (07 Marks)
   b. Explain structure of page table with respect to hierarchical paging. (08 Marks)
   c. Explain the process of segmentation. (05 Marks)

Module-4

7 a. Describe the steps in handling a page fault. (06 Marks)
   b. Explain copy on write process in virtual machine. (06 Marks)
   c. Explain FIFO and optimal page replacement algorithm. (08 Marks)

OR

8 a. Explain with a diagram any two disk allocation method in detail. (08 Marks)
   b. List the different operations performed on a directory. (06 Marks)
   c. Explain tree structured directory structure. (06 Marks)

Module-5

9 a. Explain SCAN, CSCAN and LOOK scheduling techniques. (08 Marks)
   b. Explain access matrix model of implementing protection in OS. (06 Marks)
   c. Explain bad-block recovery in detail. (06 Marks)

OR

10 a. With a diagram, explain the component of LINUX system. (08 Marks)
   b. Explain the IPC mechanisms in LINUX. (06 Marks)
   c. Discuss passing of data among process in LINUX system. (06 Marks)

* * * * *

USN | | | | | | | | | | | 18CS44

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Microcontroller & Embedded Systems

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the factors that makes ARM instruction set suitable for embedded applications.
      (05 Marks)
   b. Explain the core extensions of ARM processor with neat block diagrams. **(09 Marks)**
   c. Explain Embedded system hardware with neat block diagram. **(06 Marks)**

OR

2 a. Explain the purpose of various fields of CPSR with neat diagram. **(05 Marks)**
   b. Explain various functional units of ARM with the help of ARM core dataflow model.
      (09 Marks)
   c. Explain the ARM design philosophy. **(06 Marks)**

Module-2

3 a. What is inline barrel shifter? Describe the various operations barrel shifter supports.
      (06 Marks)
   b. Summarize the cycle timings for common instruction classes on ARM7TDMI. **(06 Marks)**
   c. Explain the various looping constructs used in ARM. **(08 Marks)**

OR

4 a. What are the various logical instructions supported by ARM? Explain with examples for each. **(06 Marks)**
   b. Summarize the scheduling of load instructions. **(06 Marks)**
   c. Explain the following instructions with syntax and example :
      (i)   MOV
      (ii) SWI
      (iii) MSR
      (iv) TST
      (08 Marks)

Module-3

5 a. List any four major application areas of embedded systems. Mention atleast two examples for embedded devices in each area. **(08 Marks)**
   b. What is a relay? Explain transistor-based relay driving circuit with diagram. **(06 Marks)**
   c. Explain brown out protection. **(06 Marks)**

OR

6 a. List four onboard communication interfaces. Explain any one in detail. **(08 Marks)**
   b. Explain the purpose of embedded systems. **(06 Marks)**
   c. Explain matrix keyboard interfacing. **(06 Marks)**

Module-4

7 a. Explain unique characteristics of embedded systems. (06 Marks)
   b. What is sequential processing model? Draw a sequential processing model for car seat belt warning system using flow chart. (08 Marks)
   c. Explain different types of serial interfaces buses deployed in automotive embedded application. (06 Marks)

OR

8 a. Explain operational quality attributes of embedded system design. (06 Marks)
   b. Explain high level language based embedded firmware development. List the advantages and disadvantages. (08 Marks)
   c. Explain Data flow graph and control data flow graph computational model with neat diagrams. (06 Marks)

Module-5

9 a. List and explain five basic functions of kernel of Real Time Operating System. (10 Marks)
   b. What is a simulator? Explain features, advantages and disadvantages of simulator based debugging. (10 Marks)

OR

10 a. Explain JTAG Based boundary scan with diagram. (10 Marks)
    b. What is a process? Explain the structure of process, process states and state transition. (10 Marks)

* * * * *

USN | | | | | | | | | | **18CS45**

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Object Oriented Concepts

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. State the important feature of Object Oriented Paradigm.   **(10 Marks)**
   b. What is constructor? List the different types of constructors and explain.   **(10 Marks)**

OR

2 a. What is static member of a class? Write C++ program to count the number of object created.
                                                                                  (10 Marks)
   b. What is function overloading? Write C++ program to define three overload function area( ) to find area of circle, triangle and rectangle.   **(10 Marks)**

Module-2

3 a. List and explain java Buzzwords.   **(10 Marks)**
   b. Explain the structure of Java.Program and its keywords with an example.   **(10 Marks)**

OR

4 a. Explain the concept of array in java with example.   **(10 Marks)**
   b. List and explain different iteration statement used in java with example.   **(10 Marks)**

Module-3

5 a. What is an exception? With syntax explain exception handling mechanism.   **(10 Marks)**
   b. Explain different access specifier in java with example.   **(10 Marks)**

OR

6 a. Define Package. What are the steps involved in creating user define package with an example.   **(10 Marks)**
   b. Compare and contrast method overloading and overriding with examples.   **(10 Marks)**

Module-4

7 a. What is meant by thread priority? How is it assigned?   **(10 Marks)**
   b. Explain key Event and mouse Event class.   **(10 Marks)**

OR

8 a. What is meant by deadlock? How to avoid deadlock? Give example.   **(10 Marks)**
   b. Explain following with syntax and example:
      i) wait( )   ii) notify( )   iii) notifyAll( )   **(10 Marks)**

Module-5

9 a. What is an applet? What are its types? Explain the skeleton of an applet.   **(10 Marks)**
   b. Explain Advantages of Swing over AWT and two key features of swings.   **(10 Marks)**

OR

10 a. Explain with syntax.
      i) JLabel   ii) JTextField   iii) JButton   iv) JCheckBox   v) JComboBox   **(10 Marks)**
   b. Write swing program for displaying any one of the options : C, C++, PHP, Java through the selection of combo box by clicking the show button   **(10 Marks)**

* * * * *

USN | | | | | | | | | | |

18CS46

Fourth Semester B.E. Degree Examination, Jan./Feb. 2023
Data Communication

Time: 3 hrs.

Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define Data Communication. Explain the five component of data communication. **(06 Marks)**
   b. Explain the functionalities of Data link layer, Network layer and transport layer. **(09 Marks)**
   c. Distinguish between TCP/IP protocols suites of OSI Model. **(05 Marks)**

OR

2 a. What is transmission impairment? Explain three causes of transmission impairment. **(07 Marks)**
   b. Determine the appropriate bit rate and signal level for a channel with a 1MHz bandwidth. The signal to noise ratio for this channel is 63. **(06 Marks)**
   c. Explain briefly how encapsulation and Decapsulation takes place in internet. **(07 Marks)**

Module-2

3 a. What is line coding? Represent the sequence 010011 using NRZ – I, NRZ – L, Manchester and differential Manchester schemes. **(08 Marks)**
   b. Explain the three step procedure of Pulse Code Modulation (PCM) for analog to digital conversion with example. **(08 Marks)**
   c. Explain any four characteristics of line coding techniques. **(04 Marks)**

OR

4 a. With neat diagram, explain Amplitude Shift Keying (ASK) and Frequency Shift Keying (FSK) conversion techniques. **(08 Marks)**
   b. Describe briefly about different transmission modes. **(06 Marks)**
   c. An analog signal has a bit rate of 8000bps and a baud rate of 1000 baud. How many data elements are carried by each signal element? How many signal elements are we need? **(06 Marks)**

Module-3

5 a. Why is signal multiplexing required. Explain synchronous TDM with data rate management strategies. **(07 Marks)**
   b. What is the significance of spread spectrum? Discuss FHSS. **(07 Marks)**
   c. Compare and contrast circuit switching with packet switching. **(06 Marks)**

OR

6 a. What is Hamming distance? Discuss about minimum hamming distance for error detection. **(06 Marks)**
   b. Define cyclic codes. Find the codeword C(X) using CRC for the information 1001 with generator 1011. **(06 Marks)**
   c. Explain direct sequence spread spectrum with an example. **(08 Marks)**

Module-4

7 a. What is the need of Bit stuffing and Byte stuffing at Data link layer? Explain with example for each. **(08 Marks)**
   b. Illustrate the working of CDMA with suitable example. **(08 Marks)**
   c. Explain three persistent methods of CDMA. **(04 Marks)**

OR

8 a. Explain the three strategies used in CSMA/CA to avoid collision. **(08 Marks)**
   b. Discuss three controlled access methods. **(06 Marks)**
   c. Draw three structures of HDLC frames. Briefly explain control field for S frame. **(06 Marks)**

Module-5

9 a. With a neat diagram of Ethernet frame, explain the seven fields. **(08 Marks)**
   b. List the goal of Fast Ethernet. Briefly explain the challenges in fast Ethernet about access method. **(08 Marks)**
   c. Explain the three reasons why CSMA/CD algorithm does not work in wireless LANS. **(04 Marks)**

OR

10 a. Explain the architecture of Bluetooth technology. **(06 Marks)**
   b. Discuss briefly the operations of the cellular telephony. **(08 Marks)**
   c. Explain the two kinds of services defined by IEEE 802.11 project. **(06 Marks)**

* * * * *