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18MAT41

Fourth Semester B.E. Degree Examination, June/July 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. Find analytic function $u + iv$, where u is given to be $u = e^x[(x^2 - y^2) \cos y - 2xy \sin y]$. (06 Marks)
 b. Derive Cauchy Reimann equations in polar form. (07 Marks)
 c. Show that $u = e^{2x} [x \cos 2y - y \sin 2y]$ is harmonic. Find the analytic function $f(z) = u + iv$. (07 Marks)

OR

- 2 a. Derive Cauchy Reimann equation in Cartesian form. (06 Marks)
 b. Determine analytic function $f(z) = u + iv$ if $u - v = e^x [\cos y - \sin y]$. (07 Marks)
 c. Show that $w = z^n$ is analytic and hence find its derivative. (07 Marks)

Module-2

- 3 a. Discuss the transformation $w = z + \frac{1}{z}, z \neq 0$. (06 Marks)
 b. Find the Bilinear transformation which maps the points $z = 1, i, -1$ onto $w = 0, 1, \infty$. (07 Marks)
 c. Evaluate $\int_0^{2+i} (\bar{z})^2 dz$ along i) line $y = x/2$ ii) real axis to 2 and then vertically to $2 + iy$. (07 Marks)

OR

- 4 a. Discuss the transformation $w = z^2$. (06 Marks)
 b. State and prove Cauchy's integral formula $f(a) = \frac{1}{2\pi i} \int_C \frac{f(z)}{z-a} dz$. (07 Marks)
 c. Evaluate using Cauchy's integral formula.

$$\int_C \frac{e^{2z}}{(z-1)(z-2)} dz \quad C: |z| = 3.$$
 (07 Marks)

Module-3

- 5 a. Define: i) Random variable ii) Discrete probability distribution with an example. (06 Marks)
 b. The probability that man aged 60 will live upto 70 is 0.65. What is the probability that out of 10 men, now aged 60 i) Exactly 9 ii) atmost 9 iii) Atleast 7 will live up to age of 70 years. (07 Marks)
 c. In a normal distribution, 3% of items are under 45 and 8% are over 64. Find the mean and standard deviation, given that $A(0.5) = 0.19$ and $A(1.4) = 0.42$. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. The probability distribution of a finite random variable X is given by

X :	-2	-1	0	1	2	3
P(x) :	0.1	K	0.2	2K	0.3	K

Find 'K', mean and variance of X.

(06 Marks)

- b. If probability of bad reaction from certain injection is 0.001. Determine the chance that out of 2000 individuals more than two will get bad reaction, and less than two will get bad reaction. (07 Marks)
- c. The frequency of accidents per shift in a factory is shown in the following table:

Accidents per shift	0	1	2	3	4
Frequency	192	100	24	3	1

Calculate mean numbers of accidents per shift. Find the corresponding Poisson distribution.

(07 Marks)

Module-4

- 7 a. Fit a second degree parabola
- $y = a + bx + cx^2$
- for the following data:

x	0	1	2	3	4	5
y	1	3	7	3	21	31

(06 Marks)

- b. Find the coefficient of correlation, lines of regression of x on y and y on x. Given,

x	1	2	3	4	5	6	7
y	9	8	10	12	11	13	14

(07 Marks)

- c. If
- θ
- is an acute angle between line of regression, then show that
- $\tan \theta = \frac{\sigma_x}{\sigma_x^2 + \sigma_y^2} \left(\frac{1-r^2}{r} \right)$
- .

Indicate the significance of the cases $r = 0$ and $r = \pm 1$.

(07 Marks)

OR

- 8 a. Fit the curve of the form
- ax^b
- and hence estimate y when
- $x = 8$
- .

x	5	10	15	20	25	30	35
y	2.76	3.17	3.44	3.64	3.81	3.95	4.07

(06 Marks)

- b. Find the rank correlation coefficient for the following data:

x	93	44	53	08	71	81	6	10	32	31
y	45	62	12	28	92	84	73	3	51	32

(07 Marks)

- c. With the usual notations compute
- \bar{x}
- ,
- \bar{y}
- and r from the following lines of regression:

$$y = 0.516x + 33.73 \text{ and } x = 0.512y + 32.52.$$

(07 Marks)

Module-5

- 9 a. The joint probability distribution for following data

X \ Y	-2	-1	4	5
1	0.1	0.2	0	0.3
2	0.2	0.1	0.1	0

Determine the marginal distributions of X and Y also calculate $E(x)$, $E(y)$, $COV(xy)$.

(06 Marks)

- b. Define: i) Null hypothesis ii) Confidence limits iii) Type I, Type II errors.

(07 Marks)

- c. The following table gives the distribution of digits in the numbers chosen at random from a telephone directory:

Digits	0	1	2	3	4	5	6	7	8	9
Frequency	1026	1107	997	966	1075	933	1107	972	964	853

Test whether the digits may be taken to occur equally frequently in the directory.

(given $\chi_{0.05}^2 = 16.92$ at $n = 9$).

(07 Marks)

OR

- 10 a. A fair coin is tossed thrice. The random variable X and Y are defined as follows. X = 0 or 1 according as head or tail occurs on first loss, Y = number of heads.
- Determine distribution of X and Y.
 - Joint probability distribution of X and Y.
 - Expectation of X, Y and XY.
- (06 Marks)
- b. It is claimed that a random sample of 49 tyres has a mean life of 15200km. Is the sample drawn from population whose mean is 15,150km and standard deviation is 200km? Test the significance level at 0.05 level.
- (07 Marks)
- c. Ten individuals are chosen at random from the population and their height in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. Test the hypothesis that the mean height of universe is 66' (value of $t_{0.05} = 2.262$ for 9.D.F).
- (07 Marks)

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CBCS SCHEME

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Fourth Semester B.E. Degree Examination, June/July 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 by applying elementary row operations :

$$A = \begin{bmatrix} 0 & 2 & 3 & 4 \\ 2 & 3 & 8 & 4 \\ 4 & 8 & 13 & 12 \end{bmatrix}$$

(06 Marks)

- b. Test for consistency and solve the system :

$$x + y + z = 6$$

$$x - y + 2z = 5$$

$$3x + y + z = 8.$$

(07 Marks)

- c. Find the eigen value and the corresponding eigen vectors of the matrix :

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}.$$

(07 Marks)

OR

- 2 a. Reduce the matrix A to the echelon form, where

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

(06 Marks)

- b. Find the values of λ and μ such that the system

$$x + y + z = 6$$

$$x + 2y + 3z = 10$$

$$x + 2y + \lambda z = \mu$$

may have

i) unique solution

ii) infinite solution

iii) no solution.

(07 Marks)

- c. Solve :

$$2x + y + 4z = 12$$

$$4x + 11y - z = 33$$

$$8x - 3y + 2z = 20$$

By Gauss elimination method.

(07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Module-2

- 3 a. The area of a circle (A) corresponding to diameter (D) is given in the following table :

D	80	85	90	95	100
A	5026	5674	6362	7088	7854

- Find the area when $D = 105$ using an appropriate interpolation formula. (06 Marks)
- b. Find the real root of the equation $\cos x = 3x - 1$ correct to three decimal places using Regula – Falsi method. (07 Marks)
- c. Evaluate $\int_0^1 \frac{x dx}{1+x^2}$ using Weddle's rule. Take seven ordinates. (07 Marks)

OR

- 4 a. Find $u_{0.5}$ from the data $u_0 = 225, u_1 = 238, u_2 = 320, u_3 = 340$ by using an appropriate interpolation formula. (06 Marks)
- b. Use Newton – Raphson method to find a real root of the equation $x^3 + 5x - 11 = 0$ correct to the three decimal places. (07 Marks)
- c. Using Simpson's $1/3^{\text{rd}}$ rule, evaluate $\int_0^1 \frac{dx}{1+x^2}$ by dividing the interval $[0, 1]$ into six equal parts. Hence deduce the value of $\log_e 2$. (07 Marks)

Module-3

- 5 a. Solve $(D^3 - 6D^2 + 11D - 6)y = 0$. (06 Marks)
- b. Solve $(D^2 - 4)y = \cos h(2x - 1) + 3^x$. (07 Marks)
- c. Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 4\cos^2 x$. (07 Marks)

OR

- 6 a. Solve $\frac{d^3y}{dx^3} + y = 0$. (06 Marks)
- b. Solve $y'' + 9y = \cos 2x \cdot \cos x$. (07 Marks)
- c. Solve $y'' - (a + b)y' + aby = e^{ax} + e^{bx}$. (07 Marks)

Module-4

- 7 a. Form a partial differential equation by eliminating the arbitrary constants in $ax^2 + by^2 + z^2 = 1$. (06 Marks)
- b. Form the partial differential equation by eliminating the arbitrary function from $\ell x + my + nz = \phi(x^2 + y^2 + z^2)$. (07 Marks)
- c. Solve $\frac{\partial^2 z}{\partial x^2} = a^2 z$, given that when $x = 0, z = 0$ and $\frac{\partial z}{\partial x} = a \sin y$. (07 Marks)

OR

- 8 a. Form a partial differential equation by eliminating the arbitrary constructs from :

$$z = xy + y\sqrt{x^2 - a^2} + b.$$

(06 Marks)

- b. Solve
- $\frac{\partial^2 z}{\partial x^2} = x + y$
- by direct integration.

(07 Marks)

- c. Solve
- $\frac{\partial^2 z}{\partial y^2} = z$
- , given that
- $z = 0$
- ,
- $\frac{\partial z}{\partial y} = \sin x$
- , when
- $y = 0$
- .

(07 Marks)

Module-5

- 9 a. Define :

- i) Sample space
- ii) Mutually exclusive events
- iii) Mutually independent events.

(06 Marks)

- b. A box contains 4 black, 5 white and 6 red balls. If 2 balls are drawn at random, what is the probability that :

- i) both are red
- ii) one black and one white.

(07 Marks)

- c. State and prove Baye's theorem.

(07 Marks)

OR

- 10 a. If A and B are events with
- $P(A \cup B) = \frac{7}{8}$
- ,
- $P(A \cap B) = \frac{1}{4}$
- and
- $P(A \cap \bar{B}) = \frac{1}{3}$
- .

Find :

- i) $P(A)$
- ii) $P(B)$
- iii) $P(\bar{A} \cap B)$.

(06 Marks)

- b. A problem is given to four students A, B, C, D whose chances of solving it are
- $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{5}$
- respectively. Find the probability that the problem is solved.

(07 Marks)

- c. Three machines A, B and C produce 50%, 30% and 20% of the items in a factory. The percentage of defective outputs of these machines are 3, 4, and 5 respectively. If an item is selected at random, what is the probability that it is defective? If a selected item is defective, what is the probability that it is from machine A?

(07 Marks)

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Fourth Semester B.E. Degree Examination, June/July 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. Define Algorithm. Summarize the properties which make the algorithm best. (08 Marks)
 b. Write an algorithm to find the sum of first and last digit of a given number. (04 Marks)
 c. Define program basic operation. Write an algorithm to find the sum of n numbers, also find the program step count for the above algorithm using step count method. (08 Marks)

OR

- 2 a. Write the Recursive algorithm for Tower of Hanoi. Prove that the time complexity is exponential. (08 Marks)
 b. What are Asymptotic Notations? How these are related to time complexity. Give example for each. (06 Marks)
 c. Discuss the important problem types, with one example for each. (06 Marks)

Module-2

- 3 a. Discuss the General Method of Divide and Conquer along with control abstraction. (06 Marks)
 b. Write an algorithm for MergeSort. Also demonstrate the applicability of Master's theorem to compute the time complexity of MergeSort. (06 Marks)
 c. Sort the below given array of elements using QuickSort. Mention Time Complexity.

2	6	4	3	9	1	7
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(08 Marks)

OR

- 4 a. What are the disadvantages of Divide and Conquer approach? (04 Marks)
 b. Discuss decrease and conquer algorithmic technique. Explain its variations. (06 Marks)
 c. Write an algorithm for the below given problems in divide and conquer approach:
 (i) Strasson's matrix multiplication
 (ii) Finding maximum and minimum element in an array. (10 Marks)

Module-3

- 5 a. Apply Greedy technique to solve the following instance of knapsack problem:
 $n = 3, M = 20,$ $W_1 W_2 W_3 = (18,15,10)$
 $V_1 V_2 V_3 = (30,21,18)$ (08 Marks)
 b. Differentiate between Prim's and Kruskal's algorithm. (04 Marks)
 c. Solve the below instance of Prim's algorithm to compute minimum cost spanning tree. Mention Time Complexity. (08 Marks)

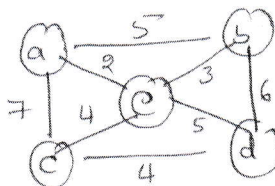


Fig. Q5 (c)

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OR

- 6 a. Find the shortest path for the given input using Dijkstra's algorithm. Consider source node as 'g'. (08 Marks)

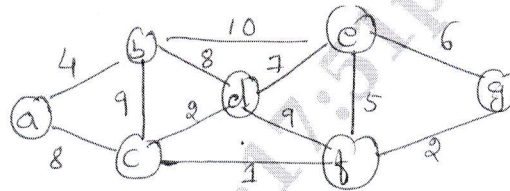


Fig. Q6 (a)

- b. Define Heap. Write Bottom-up Heap construction algorithm. (06 Marks)
 c. Write job sequencing with deadline algorithm. Also obtain an optimal schedule for the following jobs with $n = 5$. Profits = [10, 3, 3, 11, 40] and deadlines = [3, 1, 1, 2, 2] respectively. (06 Marks)

Module-4

- 7 a. Compare dynamic programming and greedy techniques. (04 Marks)
 b. With an Algorithm, solve the below given graph to compute transitive closure. (06 Marks)

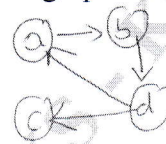


Fig. Q7 (b)

- c. Solve the below Travelling salesperson problem using Dynamic Programming Technique. Also write on algorithm and mention the time complexity.

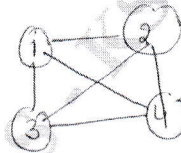


Fig. Q7 (c)

0	10	15	20
5	0	9	10
6	13	0	12
8	8	9	0

(10 Marks)

OR

- 8 a. Construct an optimal Binary search, tree for the following four-key set:

A ₁	A ₂	A ₃	A ₄
1	4	2	1

- b. Write an algorithm for (Floyd's) computing all-pairs shortest path. Derive its time complexity. (06 Marks)
 c. Write a note on : (i) Reliability design (08 Marks)
 (ii) Multi-stage graphs. (06 Marks)

Module-5

- 9 a. Give the control abstraction of Back tracking. Apply Back tracking technique to solve the sum of subset problem for the given instance. $S = \{5, 10, 12, 13, 15, 18\}$ and $d = 30$. Illustrate with possible state space tree. (08 Marks)
 b. Write an algorithm to generate the possible Hamiltonian cycles using Back Hacking method and solve the below instance to generate possible Hamiltonian cycles. (08 Marks)

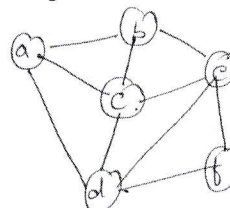


Fig. Q9 (b)

- c. Compare Branch and Bound and Back Hacking algorithm design techniques. (04 Marks)

OR

- 10 a. Solve the below instance of Job Assignment problem using Branch and Bound.

Job1	Job2	Job3	Job4	
10	2	7	8	Person a
6	4	3	7	Person b
5	8	1	8	Person c
7	6	10	4	Person d

(08 Marks)

- b. Solve the below given instance of 0/1 knapsack problem using Branch and Bound technique.

Item	Weight	Value
1	4	\$40
2	7	\$42
3	5	\$25
4	3	\$12

(08 Marks)

- c. Write a note on NP-Hard and NP complete problems.

(04 Marks)

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18CS43

Fourth Semester B.E. Degree Examination, June/July 2023 Operating System

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 the services of operating system with neat diagram. (08 Marks)
- b. What do you mean by system call? Explain the types of system call. (07 Marks)
- c. Define system program? Explain multiprogramming and time sharing system. (05 Marks)

OR

- 2 a. Explain the concept of virtual machine with neat diagram. (06 Marks)
- b. Define process. Explain Queuing diagram representation of the process. (07 Marks)
- c. What is Inter process communication? Explain message passing and shared memory concept of IPC. (07 Marks)

Module-2

- 3 a. Explain multithreading model with diagram. (04 Marks)
- b. What is dispatcher and dispatch latency? Explain the criteria used to select the scheduling algorithm. (07 Marks)
- c. Calculate the average waiting time by drawing Gantt chart using FCFS (First Come First Serve), SRTF (Shortest Remaining Time First), RR(Round Robin) ($q = 2$ ms) algorithms. (09 Marks)

Process	Arrival Time	Burst Time
P ₁	0	8
P ₂	1	4
P ₃	2	9
P ₄	3	5

OR

- 4 a. What is Critical Section? What are the requirements for critical section to satisfy? (04 Marks)
- b. Illustrate Petersons solution for critical section problem. (06 Marks)
- c. What is Semaphore? State a dining philosopher problem give a solution using semaphore. (10 Marks)

Module-3

- 5 a. What is deadlock? Explain the necessary condition for a deadlock to occur. (05 Marks)
- b. Explain in detail how deadlock can be prevented. (05 Marks)
- c. Determine whether the following system is safe state by using Banker's algorithm for the SnapShot given below.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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Continued

Allocation			
	A	B	C
P ₀	0	1	0
P ₁	2	0	0
P ₂	3	0	2
P ₃	2	1	1
P ₄	0	0	2

Maximum		
A	B	C
7	5	3
3	2	2
9	0	2
2	2	2
4	3	3

Available		
A	B	C
3	3	2

If a request from P₁ arrives for (1, 0, 2) can the requested be granted immediately? (10 Marks)

OR

- 6 a. What is paging? Illustrate with example internal and external fragmentation problem encountered in contiguous memory allocation. (07 Marks)
- b. Explain the three methods of memory allocation. With a neat diagram explain the hardware support for relocation and limit register. (07 Marks)
- c. What is segmentation? Explain with a neat diagram. (06 Marks)

Module-4

- 7 a. What is demand paging? Discuss with a neat diagram steps to handle the page fault. (08 Marks)
- b. What is copy-on-write? Consider the reference stream 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Find the number of page faults using LRV and FCFS (Frames = 3) (12 Marks)

OR

- 8 a. What is a file? Distinguish between contiguous and linked allocation methods with the neat diagram. (10 Marks)
- b. Distinguish between single level directory structure and two level directory structures. What are its advantages and disadvantages? (10 Marks)

Module-5

- 9 a. Explain various disk scheduling algorithms in detail. (10 Marks)
- b. Explain access matrix method of system protection with domain as objects and its implementation. (10 Marks)

OR

- 10 a. Explain different IPC mechanism available in Linux. (06 Marks)
- b. With the neat diagram, explain the different components of Linux system. (08 Marks)
- c. What are the design principles of Linux operating system? Explain. (06 Marks)

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18CS44

Fourth Semester B.E. Degree Examination, June/July 2023 Microcontroller and 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 architecture of an ARM based embedded device with the help of neat diagram. (08 Marks)
b. Describe the RISC design philosophy with four design rules. (06 Marks)
c. Discuss about embedded system software. (06 Marks)

OR

- 2 a. With neat diagram, explain current program status register. (10 Marks)
b. What is pipeline in ARM? Illustrate with an example, the pipeline stage of ARM 9 and ARM 10. (10 Marks)

Module-2

- 3 a. Explain BARREL shifter instructions in ARM with suitable examples. (10 Marks)
b. Explain the following with examples:
(i) RSC
(ii) MLA
(iii) STRH
(iv) SWP (10 Marks)

OR

- 4 a. Discuss about how to convert a C function to an assembly code with an example. (10 Marks)
b. Write ARM assembly language program to add two 32 bit numbers. (10 Marks)

Module-3

- 5 a. Differentiate between RISC and CISC processor/controller. (06 Marks)
b. Classify embedded systems based on performance, complexity and generation. (08 Marks)
c. Explain the different purposes of embedded systems. (06 Marks)

OR

- 6 a. Differentiate between Microprocessor and Microcontroller. (06 Marks)
b. Explain the concept of 7-segment LED display. (06 Marks)
c. Discuss about the different stepping mode supported by stepper motor. (08 Marks)

Module-4

- 7 a. With a neat block diagram, explain design and working of washing machine. (10 Marks)
b. Write about domain specific aspect of embedded systems in automatic industry. (10 Marks)

OR

- 8 a. With FSM model, explain the design an automatic tea/coffee vending machine. (10 Marks)
b. Explain super loop based approach of embedded system. (06 Marks)
c. Write down the advantage and drawbacks of assembly language based development. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-5

- 9 a. Draw the diagram of process states and explain the same. (08 Marks)
b. Discuss about the threads in the operating system context. (08 Marks)
c. Differentiate thread and process. (04 Marks)

OR

- 10 a. Explain the concept of deadlock with neat diagram. Mention the different conditions with favour a deadlock situation. (10 Marks)
b. Write a note on semaphore. (10 Marks)

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Fourth Semester B.E. Degree Examination, June/July 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. What is the need of structure? Explain with suitable examples. (06 Marks)
b. List and explain any four features of Object Oriented Programming. (08 Marks)
c. What is an inline function? Develop a C++ inline function to find maximum of two numbers. (06 Marks)

OR

- 2 a. What is the different between array of objects with array within objects. (06 Marks)
b. Explain the use of scope resolution operator with example program. (08 Marks)
c. List out the difference between procedure oriented programming with object oriented programming. (06 Marks)

Module-2

- 3 a. Define friend function. Illustrate with an example program. (06 Marks)
b. List and explain java buzz word. (06 Marks)
c. Write the program to calculate the average among the elements {4, 5, 7, 8} using for each in Java. Also show how for each is different from for loop. (08 Marks)

OR

- 4 a. List the characteristics of constructor. Implement a C++ program to define suitable parameterized constructor with default values for the class distance with data members feet and inches. (08 Marks)
b. What is nested class? Explain the use of nested class with suitable example program. (06 Marks)
c. What is namespace? Explain with suitable example. (06 Marks)

Module-3

- 5 a. Define inheritance and also define multilevel hierarchy with an example. (10 Marks)
b. Define "this" keyword and explain with example program. (04 Marks)
c. Define exception. Write a program with IllegalAccessException. Use proper exception handler so that exception should be printed. (06 Marks)

OR

- 6 a. Illustrate method overriding. Explain the rules to be followed while overriding a method. (08 Marks)
b. Write the difference between throw and throws keyword with suitable example Java program. (08 Marks)
c. Explain the use of "Super" keyword with example Java program. (04 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Define Thread. Demonstrate thread priorities in Java with example program. (10 Marks)
b. Briefly explain the role of interfaces while implementing multiple inheritance in Java. (05 Marks)
c. Demonstrate different levels of access protection available for package and their implications. (05 Marks)

OR

- 8 a. Demonstrate the role of synchronization in producer and consumer problem. (10 Marks)
b. Define package and also explain the steps involved in creating user defined packages with an example program. (06 Marks)
c. Explain the two ways of creating thread in Java. (04 Marks)

Module-5

- 9 a. Develop a swing applet that has four checkbox items like C, C++, Java and Python. When anyone of the checkbox item is selected, it should display "C checked", "C++ checked and so on. (10 Marks)
b. Build JLabel and ImageIcon with example Java program. (06 Marks)
c. Explain adapter class with an example. (04 Marks)

OR

- 10 a. Explain the following with an example for each and syntax:
i) JLabel
ii) JComboBox
iii) JTextField
iv) JButton (10 Marks)
b. Illustrate JTable with suitable example. (06 Marks)
c. Describe two key features of SWING program. (04 Marks)

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Fourth Semester B.E. Degree Examination, June/July 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. Explain OSI model with neat diagram. (10 Marks)
 b. Explain the components of data communication with diagram. (06 Marks)
 c. Explain the fundamental characteristics of data communication. (04 Marks)

OR

- 2 a. What is transmission impairment? Briefly explain three causes of transmission impairment. (08 Marks)
 b. Consider a noiseless channel with a bandwidth of 3000Hz transmitting a signal with two signal levels, calculate the maximum bit rate. (06 Marks)
 c. Explain: i) Bandwidth ii) Throughput iii) Latency. (06 Marks)

Module-2

- 3 a. What line coding? Explain any five characteristics of line coding technique. (06 Marks)
 b. Explain polar NRZ (Non Return Zero) line coding scheme with example. (08 Marks)
 c. Give the Manchester and Differential Manchester encoding for bitstream 010011. (06 Marks)

OR

- 4 a. Explain the steps involved in Pulse Code Modulation (PCM) encoder. What is PCM? (10 Marks)
 b. Discuss the different modes of data transmission. (04 Marks)
 c. Explain Frequency Shift Keying (FSK) and Phase Shift Keying (PSK). (06 Marks)

Module-3

- 5 a. What is multiplexing? Explain the frequency division multiplexing with neat diagram. (07 Marks)
 b. What is spread spectrum? Explain Direct sequence spread spectrum with neat diagram. (07 Marks)
 c. Explain circuit switching and packet switching network. (06 Marks)

OR

- 6 a. Explain the three phases involved in the communication of circuit switched Network. (06 Marks)
 b. Find the codeword $c(x)$, using CRC for the information 1001 with generator 1011. (06 Marks)
 c. With neat diagram, explain the error detection in block coding technique. (08 Marks)

Module-4

- 7 a. With neat FSM explain stop and wait protocol for data link layer to deal with flow and error control. (10 Marks)
 b. Explain the PPP frame format. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. List and explain the different controlled access protocols. (10 Marks)
b. Find the class of the following Class full IP address
i) 130.34.54.12 ii) 200.34.2.1 iii) 245.34.2.8 iv) 110.11.5.8. (04 Marks)
c. Explain the following: i) DHCP ii) NAT. (06 Marks)

Module-5

- 9 a. Describe the structure of 802.3MAC frame. (10 Marks)
b. Define Bluetooth and explain the architecture of Bluetooth. (10 Marks)

OR

- 10 a. With neat sketch explain BSS and ESS. (08 Marks)
b. What is Cellular telephony? With neat diagram explain cellular system. (06 Marks)
c. Explain the first, second and third generation of cellular telephony. (06 Marks)

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