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18MAT41

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. State and prove Cauchy – Riemann equations in Cartesian form. **(07 Marks)**

b. Find the analytic function $f(z) = u + iv$, given that $u - v = e^x[\cos y - \sin y]$. **(07 Marks)**

c. If $y(z)$ is an analytic function, then show that :

$$\left\{\frac{\partial}{\partial x}|f(z)|\right\}^2 + \left\{\frac{\partial}{\partial y}|f(z)|\right\}^2 = |f'(z)|^2 .$$ **(06 Marks)**

OR

2 a. Determine the analytic function $f(z)$, where imaginary part is $\left(\gamma - \frac{K^2}{\gamma}\right)\sin\theta$, $r \neq 0$. Hence find the real part 07 $f(z)$. **(07 Marks)**

b. Find the analytic function $f(z)$, whose real part is $u = \log\sqrt{x^2 + y^2}$. **(07 Marks)**

c. Show that $f(z) = z^u$ is analytic and hence find its derivative. **(06 Marks)**

Module-2

3 a. Discuss the transformation $w = z^2$. **(07 Marks)**

b. State and prove Cauchy's integral theorem. **(07 Marks)**

c. Evaluate : $\int_0^{(2+i)} (\bar{z})^2 dz$, along the real axis up to 2 and then vertically to 2 + i. **(06 Marks)**

OR

4 a. Evaluate : $\int_c \frac{\sin \pi z^2 + \cos \pi z^2}{(z-1)(z-2)} dz$ where c is the circle $|2| = 3$. **(07 Marks)**

b. Find the bilinear transformation that maps the points $z = 1, i, -1$ onto $w = 0, 1, \infty$. **(07 Marks)**

c. Evaluate : $\int_{(1-i)}^{(2+i)} (2x + iy + 1)\, dz$ along the straight line joining the points (1, –1) and (2, 1). **(06 Marks)**

Module-3

5 a. A coin is tossed twice. If x represents the number of heads turning up, find the probability distribution of x. also find its mean and variance. **(07 Marks)**

b. If 2% of the fuses manufactured by a firm are defective. Find the probability that a box containing 200 fuses contains : i) no defective fuses ii) 3 or more defective fuses. **(07 Marks)**

c. In a normal distribution, 31% of the items are below 45 and 8% of the items are above 64. Find the mean and standard deviation of the distribution. Given that : A(1.4) = 0.42 and A(0.5) = 0.1915. **(06 Marks)**

OR

6 a. Find the constant K such that

$$f(x) = \begin{cases} Kx^2; & -3 \le x \le 3 \\ o; & \text{otherwise} \end{cases}$$

is a probability density function. Also find :

i) $P(1 \le x \le 2)$

ii) $P(x \le 2)$

iii) $P(x > 1)$. **(07 Marks)**

b. When a coin is tossed 4 items, find the probability of getting

i) exactly one head

ii) at most 3 heads

iii) at least 2 heads. **(07 Marks)**

c. If x is an exponential variate with mean 5. Evaluate :

i) $P(0 < x <)$

ii) $P(-\infty < x < 10)$

iii) $P(x \le 0)$ or $(x \ge 1)$. **(06 Marks)**

Module-4

7 a. Find the coefficient of correlation and the lines of regression for the following data :

x	1	2	3	4	5
y	2	5	3	8	7

(07 Marks)

b. Fit a curve of the form $y = ax^b$ for the data :

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

(07 Marks)

c. If the equations of regression lines of two variables x and y are $x = 19.13 - 0.879$ and $y = 11.64 - 0.5x$. Find the correlation coefficient and the means of x and y. **(06 Marks)**

OR

8 a. Compute the rank correlation coefficient for the following data :

x	68	64	75	50	64	80	75	40	55	64
y	62	58	68	45	81	60	68	48	50	70

(07 Marks)

b. Fit a parabola $y = a + bx + cx^2$ by the method of least squares to the following data :

x	1	2	3	4	5	6	7
y	2.3	5.2	9.7	16.5	29.4	35.5	54.4

(07 Marks)

c. Compute the mean values of x and y and the coefficient correlation for the regression lines $2x + 3y + 1 = 0$ and $x + 6y - 4 = 0$. **(06 Marks)**

Module-5

9 a. The joint probability distribution of two random variables x and y is defined by the function $P(x,y) = \frac{1}{27}(2x+y)$, where x and y assume the values 0, 1, 2. Find the marginal distributions of x and y. Also compute E(x) and E(y). **(07 Marks)**

b. Fit a Poisson distribution for the following data and test the goodness of fit. Given that $\Psi^2_{0.05} = 9.49$ for degrees of freedom 4. **(07 Marks)**

c. Write short notes on :
i) Null hypothesis
ii) Type – I and Type – II
iii) Level of significance. **(06 Marks)**

OR

10 a. Joint probability distribution of two random variables is given by the following data :

x \ y	–3	2	4
1	0.1	0.2	0.2
3	0.3	0.1	0.1

Find :
i) Marginal distributions of x and y
ii) Cov(x, y)
iii) P(x, y). **(07 Marks)**

b. The following are the I·Q's of a randomly chosen sample of 10 boys.
70, 120, 110, 101, 88, 83, 95, 98, 107, 100
Does this data support the hypothesis that the population mean of I·Q's is 100 at 5% level of significance? Given $t_{0.05} = 2.26$. **(07 Marks)**

c. A sample of 900 items is found to have the mean 3.4. Can it be reasonably regarded as a truly random sample from a large population with mean 3.25 and standard deviation 1.61 at 5% level of significance? Given $Z_{0.05} = 1.96$ (Two Tailed Test). **(06 Marks)**

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18MATDIP41

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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 $\begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$. **(06 Marks)**

b. Solve by using Gauss elimination method. Given $x+y+z=9$, $2x+y-z=0$ and $2x+5y+7z=52$. **(07 Marks)**

c. Find the eigen values and eigen vectors of the matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$. **(07 Marks)**

OR

2 a. Find the rank of the matrix $\begin{bmatrix} 0 & 1 & -3 & -1 \\ 1 & 0 & 1 & 1 \\ 3 & 1 & 0 & 2 \\ 1 & 1 & -2 & 0 \end{bmatrix}$. **(06 Marks)**

b. Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} -19 & 7 \\ -42 & 16 \end{bmatrix}$. **(07 Marks)**

c. Find the values of λ and μ so that the equations $x+y+z=6$, $x+2y+3z=10$ and $x+2y+\lambda z=\mu$ have (i) no solution (ii) a unique solution (iii) an infinite number of solutions. **(07 Marks)**

Module-2

3 a. Using Newton Raphson method, find the real root of the equation $3x=\cos x+1$, correct to four decimal places. Take $x = 0.6$ as the initial approximation. **(06 Marks)**

b. Given f(40) = 184, f(50) = 204, f(60) = 226, f(70) = 250, f(80) = 276, f(90) = 304. Find f(85) using Newton's backward difference interpolation formula. **(07 Marks)**

c. Evaluate $\int_0^6 \frac{1}{1+x^2}dx$ by using Simpson's $\frac{1}{3}$ rule by considering 6 subintervals. **(07 Marks)**

OR

4 a. Using Regula Falsi method, find a real root of the equation $x\log_{10}x-1.2=0$ which lies in (2, 3). Carryout 3 iterations. **(06 Marks)**

b. Using the following data, find y when x = 1. Given,

x	3	4	5	6	7	8	9
y	4.8	8.4	14.5	23.6	36.2	52.8	73.9

Use Newton's forward interpolation formula. **(07 Marks)**

c. Evaluate $\int_4^{5.2} \log x\,dx$ by using Weddle's rules taking 6 subintervals. **(07 Marks)**

Module-3

5 a. Solve $(D^3+3D^2+3D+1)y=0$. **(06 Marks)**

b. Solve $(D^2+7D+12)y=\cosh x$. **(07 Marks)**

c. Solve $(D^2-4D+4)y=\cos 2x$. **(07 Marks)**

OR

6 a. Solve $(4D^4-8D^3-7D^2+11D+6)y=0$. **(06 Marks)**

b. Solve $(D^2-6D+9)y=6e^{3x}$. **(07 Marks)**

c. Solve $(D^2-5D+6)y=\sin 3x$. **(07 Marks)**

Module-4

7 a. Form the partial differential equation by eliminating arbitrary functions from $z=y^2+2f\left(\frac{1}{x}+\log y\right)$. **(06 Marks)**

b. Form the PDE by eliminating arbitrary constants a and b from the relation $(x-a)^2+(y-b)^2+z^2=k^2$. **(07 Marks)**

c. Solve $\frac{\partial^2 z}{\partial x^2}=a^2z$, 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 function from $\phi(x+y+z,\ x^2+y^2+z^2)=0$. **(06 Marks)**

b. Form a partial differential equation by eliminating arbitrary function from $z=f(x+ct)+g(x-ct)$. **(07 Marks)**

c. Solve $\frac{\partial^2 z}{\partial x\partial y}=\sin x\sin y$ by direct integration. Given that $\frac{\partial z}{\partial y}=-2\sin y$ when x = 0 and z = 0 when y is an odd multiple of $\frac{\pi}{2}$. **(07 Marks)**

Module-5

9 a. Given $P(A)=\frac{1}{4}$, $P(B)=\frac{1}{3}$ and $P(A\cup B)=\frac{1}{2}$. Find P(A/B), P(B/A), $P(A\cap\overline{B})$ and $P(A/\overline{B})$. **(06 Marks)**

b. The probability that three students A, B, C, solve a problem is $\frac{1}{2},\frac{1}{3},\frac{1}{4}$ respectively. If the problem is simultaneously assigned to all of them, what is the probability that the problem is solved? **(07 Marks)**

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

OR

10 a. If A and B are independent events, show that $\overline{A}$ and $\overline{B}$ are also independent. **(06 Marks)**

b. The probability that a team wins a match is $\frac{3}{5}$. If this team plays 3 matches in a tournament, what is the probability that the team wins (i) atleast one match (ii) all matches. **(07 Marks)**

c. An office has 4 secretaries handling respectively 20%, 60% and 15% and 5% of the files of all government reports. The probability that they misfile such reports is respectively 0.05, 0.1 and 0.05. Find the probability that a misfiled report can be blamed on first secretary? **(07 Marks)**

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18CS42

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Design & 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 asymptotic notations BigO, Big Ω and Bigθ that are used to compare the order of growth of an algorithm with example. **(06 Marks)**

b. List two methods to measure the time complexity of algorithm by counting program steps. Apply the same for the algorithm to find the SUM of n numbers. **(06 Marks)**

c. Write an algorithm to search a key using sequential search. Derive its time efficiency for best case, worst case and average case. **(08 Marks)**

OR

2 a. Define an Algorithm. Discuss the criteria's that an algorithm must satisfy with an example. **(06 Marks)**

b. Consider the following algorithm :

```
Algorithm : GUESS (A[ ][ ])
Method : for i ← 0 to n – 1
             for j ← 0 to i
             A[i] [j] ← 0
```

(i) What does the algorithm compute?
(ii) What is the basic operation?
(iii) What is the time complexity of this algorithm? **(06 Marks)**

c. Explain the mathematical analysis of non-recursive algorithm. Write an algorithm to check whether all the elements of given array are distinct. Give its worst case time complexity. **(08 Marks)**

Module-2

3 a. Write the algorithm for Merge Sort. Illustrate with an example. **(06 Marks)**

b. Apply the source removal method to obtain topological sort for the graph in Fig. Q3 (b). **(06 Marks)**

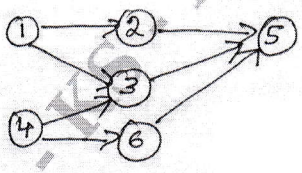

Fig. Q3 (b)

c. Apply quicksort to sort the following list in ascending order :
25, 91, 46, 35, 11, 82, 14, 55
Represent the recursive call in the form of tree. **(08 Marks)**

OR

4 a. What are the 3 variations of decrease and conquer technique. Explain in detail. **(06 Marks)**

b. Solve the following recurrence relation and find the upper bound using substitution method.

$$T(n) = 2.T\left(\frac{n}{2}\right) + n \; ; \; T(1) = 2$$ **(06 Marks)**

c. Explain recursive binary search algorithm. Derive its time efficiency for best, worst and average case. **(08 Marks)**

Module-3

5 a. What is the solution generated by job sequencing when n = 5
$(P_1, P_2, P_3, P_4, P_5) = (20, 15, 10, 5, 1)$
$(d_1, d_2, d_3, d_4, d_5) = (2, 2, 1, 3, 3)$ **(06 Marks)**

b. Construct Huffman code for the following data :

Symbol :	A	B	C	D	E
Frequency :	0.35	0.1	0.2	0.2	0.15

Also Encode CAB and DAC. **(06 Marks)**

c. Apply Prisms and Kruskals algorithm to get the minimium spanning tree for the graph given in Fig. Q5 (c). **(08 Marks)**

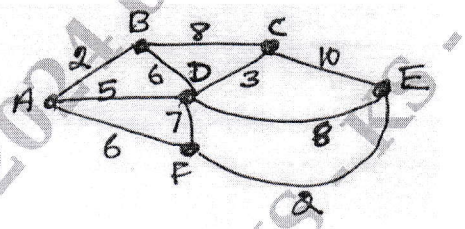

Fig. Q5 (c)

OR

6 a. Obtain the solution for the fractional Knapsack problem using greedy method for n = 3. Capacity m = 20, Values $V_1 = 25$, $V_2 = 24$, $V_3 = 15$ and weights $w_1 = 18$, $w_2 = 15$, $w_3 = 10$ respectively. **(06 Marks)**

b. Sort the array 2, 9, 7, 6, 5,8 by heap sort. Show the intermediate steps. **(06 Marks)**

c. Apply Dijikstra's algorithm to find single some shortest path for the graph given in Fig. Q6 (c). Consider node 6 as source. **(08 Marks)**

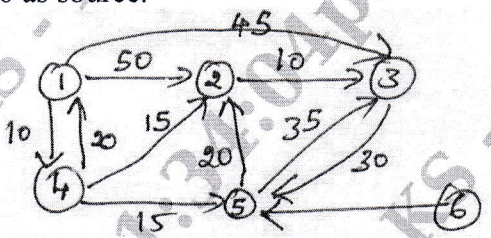

Fig. Q6 (c)

Module-4

7 a. Find all pair shortest path for the graph given in Fig. Q7 (a) using Floyd's algorithm. **(10 Marks)**

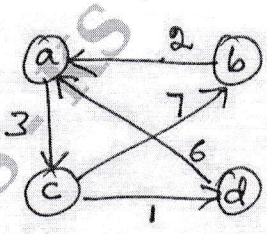

Fig. Q7 (a)

b. Apply bottom up dynamic programming algorithm for the following instance of the knapsack problem. Knapsack capacity M = 10.

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

(10 Marks)

OR

8 a. Apply Bellman-ford algorithm to the graph given in Fig. Q8 (a). Find the shortest path to all the vertices from S. **(10 Marks)**

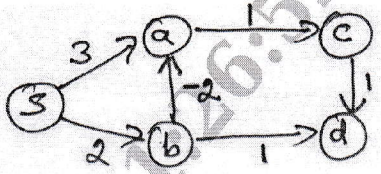

Fig. Q8 (a)

b. Solve the following TSP using dynamic programming,

$$\begin{array}{c} \\ 1 \\ 2 \\ 3 \\ 4 \end{array} \begin{array}{c} \begin{array}{cccc} 1 & 2 & 3 & 4 \end{array} \\ \begin{pmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{pmatrix} \end{array}$$

Starting City = 1

(10 Marks)

Module-5

9 a. Let w = {3, 5, 6, 7} and m =15. Find all possible subsets of w that sum to m. Draw the state space tree. **(10 Marks)**

b. With the help of state space tree, solve the following instance of knapsack problem by branch and bound algorithm. Knapsack capacity w = 10.

Item No.	1	2	3	4
Weight	4	7	5	3
Value	40	42	25	12

(10 Marks)

OR

10 a. Apply branch and bound algorithm to solve the TSP for the graph given in Fig.Q10 (a). Consider start city as A. Give the state space tree. **(10 Marks)**

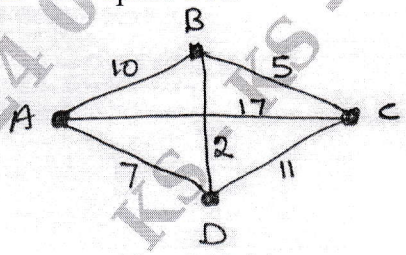

Fig. Q10 (a)

b. Explain the following with example :
(i) Class NP problems
(ii) Class P problems
(iii) NP complete problem
(iv) NP hard problem **(10 Marks)**

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18CS43

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. What is Operating System? Explain the role of operating system from different view points. **(05 Marks)**

b. With a neat diagram, describe the storage structure and I/O structure of operating system. **(10 Marks)**

c. Explain the dual mode of operation of an operating system. **(05 Marks)**

OR

2 a. List and explain the services provided by operating system for the user and efficient operation of system. **(06 Marks)**

b. Describe the implementation of interprocess communication using shared memory and message passing. **(08 Marks)**

c. Explain the different states of a process, with a neat diagram. **(06 Marks)**

Module-2

3 a. Explain different types of multithreading models. **(07 Marks)**

b. Explain different scheduling criteria in process scheduling concept. **(05 Marks)**

c. Consider the following set of processes with CPU burst time (in ms).

Process	Arrival Time	Burst Time
P1	0	6
P2	1	3
P3	2	1
P4	3	4

Compute the average waiting time and average turnaround time for the above processes using FCFS and Round Robin (Time Quantum = 2 ms) scheduling algorithm. **(08 Marks)**

OR

4 a. What is critical section problem? What are the requirements that solution to the critical reaction problem must satisfy? **(06 Marks)**

b. With an example, explain the Peterson's solution for critical section problem and prove that all the three requirements are preserved. **(07 Marks)**

c. Show how semaphores provide solution to reader writers problem. **(07 Marks)**

Module-3

5 a. What is deadlock? What are the necessary conditions an operating system must satisfy for a deadlock to occur? **(05 Marks)**

b. Determine whether the following system is in safe state by using Banker's algorithm.

Process	Allocation			Maximum			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			
P_4	0	0	0	4	3	3			

If a request for P_1 arrives for (1 0 2), can the request be granted immediately. **(10 Marks)**

c. Discuss the various approaches used for deadlock recovery. **(05 Marks)**

OR

6 a. With a neat diagram, explain the various steps of address binding. **(07 Marks)**

b. Distinguish between internal and external fragmentation. **(04 Marks)**

c. What are Translation Lookaside Buffer (TLB)? Explain TLB in detail with a simple paging system with a neat diagram. **(09 Marks)**

Module-4

7 a. Describe the steps in handling a page fault. **(10 Marks)**

b. Consider the following page reference string 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. Assuming there are 3 memory frames and all are initially empty. How many page faults would occur in case of (i) FCFS (ii) LRU (iii) Optimal Page replacement **(10 Marks)**

OR

8 a. Explain briefly the various operations performed on files. **(05 Marks)**

b. Explain the various types of directory structure with a neat diagram. **(10 Marks)**

c. Explain the various access methods of files. **(05 Marks)**

Module-5

9 a. Explain the following disk scheduling algorithm with examples:
(i) FCFS (ii) SSTF (iii) SCAN (iv) LOOK **(10 Marks)**

b. Explain the access matrix model of implementing protection in operation system. **(10 Marks)**

OR

10 a. Explain the components of Linux system with a neat diagram. **(05 Marks)**

b. Explain process management in a Linux system. **(08 Marks)**

c. Explain the file system implementation in Linux. **(07 Marks)**

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18CS44

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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 ARM core data flow model with neat diagram. **(08 Marks)**

b. List and explain ARM processor modes. Also explain ARM core changing from user mode to interrupt request mode on an exception, with a neat diagram. **(08 Marks)**

c. Differentiate: Microprocessor vs Microcontroller. **(04 Marks)**

OR

2 a. What is pipeline? Compare ARM7 three stage pipeline, ARM9 fire-stage pipeline and ARM10 six stage pipeline. **(08 Marks)**

b. Explain exception of interrupt. Narrate interrupt vector table. **(08 Marks)**

c. Write a short note on Hardware extensions for a ARM core. **(04 Marks)**

Module-2

3 a. Explain single register load store addressing modes with examples. **(08 Marks)**

b. Explain the program status register instructions. Also write a code fragment to.
i) Copy the cpsr into register r1
ii) Clear bit 7 of r1
iii) Copy the register r2 back to cpsr. **(08 Marks)**

c. Explain the following ARM instructions with examples:
i) BIC ii) MRS iii) STMIB iv) SWP. **(04 Marks)**

OR

4 a. With neat diagram and example, explain block memory transfer in the memory map using load-store multiple instructions. **(08 Marks)**

b. Explain stack operation of ARM processors. Also explain the load-store multiple addressing aliases available to support stack operations. **(08 Marks)**

c. Explain software interrupt instruction with its syntax. **(04 Marks)**

Module-3

5 a. Write a function in assembly that can sum any number of integers. The argument should be the number of integers to sum followed by a list of the integers. **(08 Marks)**

b. What is an Embedded system? Explain the different classifications of embedded systems. Give example for each. **(08 Marks)**

c. Write the difference between microprocessors and microcontrollers. **(04 Marks)**

OR

6 a. What is Programmable Logic Device (PLD)? What are the different types of PLDs? Explain advantages of PLDs in embedded system design. **(08 Marks)**

b. What is 7-segment LED display? What are two different configurations of 7-segment LED display? Explain. **(08 Marks)**

c. Differentiate sensors v/s actuators. **(04 Marks)**

Module-4

7 a. What is hardware software co-design? Explain the fundamental issues in hardware software co-design. **(08 Marks)**

b. Explain the product life-cycle curve of an embedded product development. **(08 Marks)**

c. What is the difference between compiler and cross compiler? **(04 Marks)**

OR

8 a. Explain different embedded firmwave design approaches in detail. **(08 Marks)**

b. Explain sequential program model. **(08 Marks)**

c. Differentiate 'C' versus 'Embedded C'. **(04 Marks)**

Module-5

9 a. What is Kernal? What are the different functions handled by Kernal for a general purpose OS? **(08 Marks)**

b. What is Task Control Block (TCB)? Explain structure of TCB. **(08 Marks)**

c. Differentiate between thread and process. **(04 Marks)**

OR

10 a. Explain different techniques available for embedding firmwave into the target board for a non-os based embedded system. **(08 Marks)**

b. Explain structure of a process and explain process life cycle with various activities involved in the creation of process. **(08 Marks)**

c. Write a note on Remote Procedure Call (RPC) mechanism for IPC. **(04 Marks)**

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18CS45

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. Explain the various features of Object Oriented Concept. **(08 Marks)**
b. Explain function overloading with an example. **(08 Marks)**
c. Explain type conversion with an example. **(04 Marks)**

OR

2 a. List properties of friend function. Write a C++ program to add two numbers using friend function. **(08 Marks)**
b. What is an inline function? Write a C++ program to find the maximum of two numbers using inline function. **(08 Marks)**
c. Explain scope resolution operator with an example. **(04 Marks)**

Module-2

3 a. List characteristics of constructor. Explain default constructor with an example. **(08 Marks)**
b. Explain with examples,
(i) Array and Objects
(ii) Destructors **(08 Marks)**
c. Write short notes on namespace with example. **(04 Marks)**

OR

4 a. List and explain Java Buzzwords. **(08 Marks)**
b. Describe the program to calculate the average among the elements (4, 8, 10, 12) using for each in Java. How it is different from for loop? **(08 Marks)**
c. Explain switch case with an example. **(04 Marks)**

Module-3

5 a. Explain the concept of Inheritance and its classification in Java. **(08 Marks)**
b. Explain exception handling mechanism with an example. **(08 Marks)**
c. Write short notes on this keyword with an example. **(04 Marks)**

OR

6 a. Explain the Java garbage collection. **(08 Marks)**
b. Discuss the following terms with an example :
(i) Super keyword
(ii) Final keyword **(08 Marks)**
c. Explain the method overriding with an example. **(04 Marks)**

Module-4

7 a. Explain the packages in Java with an example. **(10 Marks)**
b. Explain the interfaces in Java using suitable code. **(10 Marks)**

OR

8 a. Explain the concept of multithreading in Java. Explain how to make class threadable? **(10 Marks)**

b. With a syntax, explain is Alive ( ) and Join ( ) with suitable program. **(10 Marks)**

Module-5

9 a. What is an applet? Explain the life cycle of the applet. **(10 Marks)**

b. Write a short notes on :
(i) Event listener interface
(ii) Event classes **(10 Marks)**

OR

10 Explain the following with suitable code :
a. JButton
b. JLabel
c. JComboBox
d. JSlider **(20 Marks)**

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CBCS SCHEME

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

18CS46

Fourth Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. With a neat diagram, explain the components of data communication. **(06 Marks)**

b. With necessary diagrams, give the advantages and disadvantages of star and mesh topology. **(08 Marks)**

c. A channel with a 1-MHz bandwidth has a SNR value 15. Calculate bit rate and signal levels. **(06 Marks)**

OR

2 a. What is data communication? Explain the fundamental characteristics of data communication. **(06 Marks)**

b. With a neat diagram, explain encapsulation and decapsulation process in TCP/IP model. **(08 Marks)**

c. Calculate the propagation time and the transmission time for a 2.5 Kbyte message, if the bandwidth of the network is 1 Gbps. Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s. **(06 Marks)**

Module-2

3 a. With a neat diagram, illustrate pulse code modulation encoder and decoder along with quantization levels. **(12 Marks)**

b. Represent sequence 01001110 using polar NRZ-L, Manchester, AMI and psuedoternary line coding schemes. **(08 Marks)**

OR

4 a. With appropriate diagrams, explain transmission modes in physical layer. **(10 Marks)**

b. With necessary diagrams, explain amplitude shift keying and frequency shift keying along with the implementation and bandwidth requirements. **(10 Marks)**

Module-3

5 a. What is spread spectrum? Describe two different techniques to spread the bandwidth. **(10 Marks)**

b. Four channels are multiplexed using Time division multiplexing. If each channel sends 100 bytes/s and we multiplex 1 byte per channel, show the frame travelling on the link, the size of the frame, the duration of a frame and bit rate for the link. **(10 Marks)**

OR

6 a. With appropriate diagrams, explain frequency division multiplexing and wavelength division multiplexing. **(10 Marks)**

b. A bit stream 10011101 is transmitted using the standard CRC method. The generator polynomial is x^3+1. What is the actual bit string transmitted? Suppose the third bit from the left is inverted during transmission. How will receiver detect this error? **(10 Marks)**

Module-4

7 a. With a neat flow diagram, illustrate the working of CSMA/CA protocol. **(10 Marks)**

b. Explain the three channelization protocols in the data link layer. **(10 Marks)**

OR

8 a. With neat FSM state diagram at the sender and receiver, explain stop and wait protocol. **(10 Marks)**

b. With necessary diagrams, explain any two controlled access protocols. **(10 Marks)**

Module-5

9 a. Describe the frame format of standard Ethernet. **(10 Marks)**

b. With necessary diagrams, explain the architecture of IEEE 802.11 standard. **(10 Marks)**

OR

10 a. With neat diagram, explain the Bluetooth architecture. **(10 Marks)**

b. Explain the operation of cellular telephony. **(10 Marks)**

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