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**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
An Autonomous Institution  
MANGALURU

### Department of Mathematics

#### Continuous Internal Evaluation Test I - EVEN Semester 2022 - 23

Course Title: Computational Mathematics II

Course Code: 21MAT403

Date: 14/06/2023

Time: 9.30 AM – 10.45AM

Semester: IV

Faculty: Mrs.Suchetha sheka, Mrs Aysha Shabana, Mrs. Mary Jency, Ms.Deepthi KM

Max. Marks: 30

**Note:** Answer any TWO full questions, choosing one full question from each module.

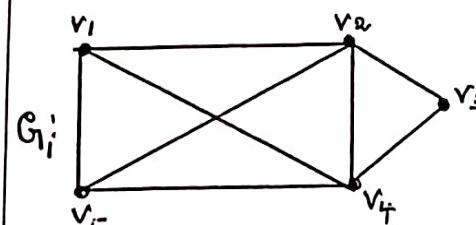
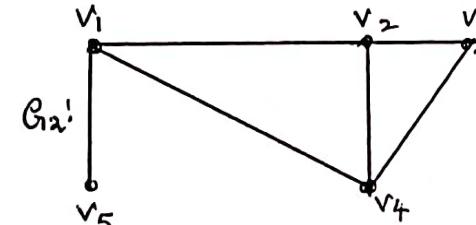
#### Module - I

Q. No.	Questions	Marks	Bloom's Level	CO No.
1	a. State and Prove Cauchy Reimann equations in the cartesian form	5	CL3	CO1
	b. Show that $w = \log z, z \neq 0$ is analytic and hence find $\frac{dw}{dz}$ .	5	CL3	CO1
	c. Find the analytic function $f(z)$ whose real part is $\frac{\sin 2x}{\cosh 2y - \cos 2x}$	5	CL3	CO1

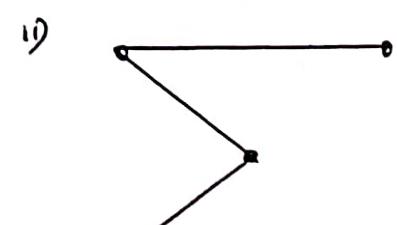
**OR**

2	a. If $f(z)$ is analytic then show that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)  f(z) ^2 = 4 f'(z) ^2$	5	CL3	CO1
	b. Find the regular function $f(z)$ whose imaginary part is $(r - \frac{k^2}{r}) \sin \theta, r \neq 0$ hence find the real part.	5	CL3	CO1
	c. Show that $v = \cos x \sinh y$ is harmonic and find its harmonic conjugate.	5	CL3	CO

#### Module - V

Q. No.	Questions	Marks	Bloom's Level	CO No.
3	i) Write a short note on Operations of graphs. ii) Explain the term Decomposition and Deletion of graphs. iii) Find union, intersection and ring sum of the following graphs:  G <sub>1</sub> :  G <sub>2</sub> : 	8	CL3	CO2
	i) Define a tree with an example ii) State any four standard theorems of trees. iii) Explain the term Leaf, and Pendant vertex of a tree			

**OR**

	i) Write the difference between complement of simple graph and complement of a subgraph with an example. ii) Find complement of the following graphs.			
4	<p>a.</p>  <p>i)</p>  <p>ii)</p>		8	CL3 CO2
b.	i) Explain any four types of a rooted tree with an example	7	CL3	CO2

### Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

### Course Outcomes

CO1	Use the concepts of an analytic function and complex potentials to solve the problems arising in electromagnetic field theory.	CL3
CO2	Basics of Graph theory and comparing different types of graphs, trees, and their applications related to real-life engineering problems	CL3
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in an engineering field.	CL3
CO4	Apply the Principles of Sampling as a means of making inferences about a population. Demonstrate the validity of testing the hypothesis.	CL3
CO5	Make use of correlation and regression analysis to fit a suitable Mathematical model for the statistical data. Obtain Optimal solutions using graphical and Simplex method	CL3

CS - 20  
CY - 63  
IS - 139  
DS - 34

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**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
MANGALURU

Department of Mathematics

Continuous Internal Evaluation Test II-EVEN Semester 2022 - 23

Course Title: Computational Mathematics II

Course Code: 21MAT401

Date: 20-07-2023

Time: 9.30 AM- 10.45AM

Semester: IV

Faculty: Mrs. Suchetha, Mrs. Aysha shabana, Mrs. Mary Jency & Ms. Deepthi  
KM

Max. Marks: 30

Answer ONE FULL question from each module.

Module -II

Q. No.	Questions	Marks	Bloom's Level	CO Nc.
1	<p>a Apply the merge sort to the list -1,7,4,11,5, -8,15, -3, -2,6,10,3</p> <p>b Construct an optimal prefix code for the symbols a,o,q,u,y,z that occur with frequencies 20,28,4,17,12,7 respectively.</p> <p>c Find the optimal prefix codes for the words i) BEST ii) SPLIT for the given binary tree.</p>	5	CL3	CO2
		5	CL3	CO2

OR

a	<p>(i) Construct the binary tree of the Prefix code <math>P = \{00, 01, 101, 110, 111\}</math></p> <p>(ii) Decode (i) 1001111101 (ii) 10111100110001101 (iii) 110111110010 using prefix code a:111 b:0 c:1100 d:1101 e:10</p>	5	CL3	CO2
b	What do you mean by Weighted tree? Find weight of the following trees.			
2	<p>(i)</p> <p>(ii)</p> <p>(iii)</p>	5	CL3	CO2
c	Obtain optimal prefix code for the message MISSION SUCCESSFULL Indicate the code.	5	CL3	CO2

### Module -III

Q. No.	Questions	Marks	Bloom's Level	CO No.														
	<p>a) A random variable <math>X</math> has the following probability function for various values of <math>x</math>:</p> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td><math>x</math></td><td>-2</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr> <tr> <td><math>P(x)</math></td><td>0.1</td><td><math>k</math></td><td>0.2</td><td><math>2k</math></td><td>0.3</td><td><math>k</math></td></tr> </table> <p>Find (i) the value of <math>k</math>, mean and variance (ii) <math>P(x &gt; -1)</math></p>	$x$	-2	-1	0	1	2	3	$P(x)$	0.1	$k$	0.2	$2k$	0.3	$k$	5	CL3	CO3
$x$	-2	-1	0	1	2	3												
$P(x)$	0.1	$k$	0.2	$2k$	0.3	$k$												
3	<p>b) A manufacturer of metal pistons finds that, 12% of his pistons are rejected because they are either oversize or undersize. What is the probability that a batch of 10 pistons will contain (i) no more than 2 rejects? (ii) at least 2 rejects (iii) only 3 rejects?</p>	5	CL3	CO3														
	<p>c) Find the unique fixed probability for regular stochastic matrix</p> $P = \begin{bmatrix} 0.5 & 0.25 & 0.25 \\ 0.5 & 0 & 0.5 \\ 0 & 1 & 0 \end{bmatrix}$	5	CL3	CO3														
OR																		
	<p>a) The probability density function of a random variable <math>X</math> is</p> $f(x) = \begin{cases} kx^2, & -3 < x < 3 \\ 0, & \text{otherwise} \end{cases}$ <p>Find (i) the value of <math>k</math> (ii) <math>P(1 \leq x \leq 2)</math> and (iii) <math>P(x &gt; 1)</math>.</p>	5	CL3	CO3														
4	<p>b) In a normal distribution, 31% of the items are under 45 and 8% of the items are over 64. Find the mean and standard deviation of the distribution. (Given <math>\Phi(0.5) = 0.1915</math> and <math>\Phi(1.4) = 0.4192</math>)</p> <p>c) The joint probability distribution of two discrete random variables <math>X</math> and <math>Y</math> is given by <math>f(x, y) = k(2x+y)</math> where <math>x</math> and <math>y</math> are integers such that <math>0 \leq x \leq 2</math>, <math>0 \leq y \leq 3</math></p> <p>a) Find the value of 'k'      b) Find the marginal distribution of <math>X</math> and <math>Y</math>      c) Show that the random variables <math>X</math> and <math>Y</math> are dependent</p>	5	CL3	CO3														

#### Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create
Course Outcomes						
CO1	Construct analytical functions to solve problems in electromagnetic field theory					CL3
CO2	Utilize basic concepts of Graph theory to develop algorithms of prefix codes.					CL3
CO3	Illustrate Discrete and Continuous random variables and Probability distribution functions to analyse the probability models in engineering field					CL3
CO4	Validate hypothesis testing and apply the Principles of Sampling to infer the nature of population					CL3
CO5	Solve LPP and use correlation and regression analysis to fit a Mathematical model for statistical data.					CL3

Am Bergisch

CS - 402

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**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
MANGALURU

**Department of Mathematics**

**Continuous Internal Evaluation Test III-EVEN Semester 2022 - 23**

Course Title: Computational Mathematics II		Course Code: 21MAT401
Date: 21-08-2023	Time: 9.30 AM- 10.45AM	Semester: IV
Faculty: Mrs. Suchetha sheka, Mrs. Aysha Shabana, Mrs. Mary Jency & Ms. Deepthi KM		Max. Marks: 30

Answer ONE FULL question from each Module.

**Module -IV**

Q. No.	Questions	Mar ks	Bloom' s Level	CO No.																
1	<p>a</p> <p>Obtain the lines of regression and hence find the coefficient of correlation for the data:</p> <table border="1"> <tr> <td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr> <tr> <td>y</td><td>9</td><td>8</td><td>10</td><td>12</td><td>11</td><td>13</td><td>14</td></tr> </table>	x	1	2	3	4	5	6	7	y	9	8	10	12	11	13	14	5	CL3	CO4
x	1	2	3	4	5	6	7													
y	9	8	10	12	11	13	14													
<p>b</p> <p>A simply supported beam carries a concentrated load P at its midpoint. Corresponding to various values of P, the maximum deflection Y is measured and given below:</p> <table border="1"> <tr> <td>P</td><td>100</td><td>120</td><td>140</td><td>160</td><td>180</td><td>200</td></tr> <tr> <td>Y</td><td>0.45</td><td>0.55</td><td>0.55</td><td>0.70</td><td>0.80</td><td>0.85</td></tr> </table> <p>Find a best fitting straight line in the form <math>Y=a+bP</math> to the above data and hence estimate Y when P=150.</p>	P	100	120	140	160	180	200	Y	0.45	0.55	0.55	0.70	0.80	0.85	5	CL3	CO4			
P	100	120	140	160	180	200														
Y	0.45	0.55	0.55	0.70	0.80	0.85														
	<p>c</p> <p>Maximize <math>z = 5x + 4y</math> subject to the constraints:</p> $x + 2y \geq 10, x + y \geq 8, 2x + y \geq 12, x \geq 0, y \geq 0$ <p>by graphical method</p>	5	CL1	CO4																

**OR**

2	<p>a</p> <p>Fit a second-degree parabola to the following data:</p> <table border="1"> <tr> <td>x</td><td>1</td><td>1.5</td><td>2</td><td>2.5</td><td>3</td><td>3.5</td><td>4</td></tr> <tr> <td>y</td><td>1.1</td><td>1.3</td><td>1.6</td><td>2</td><td>2.7</td><td>3.4</td><td>4.1</td></tr> </table>	x	1	1.5	2	2.5	3	3.5	4	y	1.1	1.3	1.6	2	2.7	3.4	4.1	5	CL3	CO4					
x	1	1.5	2	2.5	3	3.5	4																		
y	1.1	1.3	1.6	2	2.7	3.4	4.1																		
<p>b</p> <p>Calculate the coefficient of rank correlation for the following data</p> <table border="1"> <tr> <td>x</td><td>68</td><td>64</td><td>75</td><td>50</td><td>64</td><td>80</td><td>75</td><td>40</td><td>55</td><td>64</td></tr> <tr> <td>y</td><td>62</td><td>58</td><td>68</td><td>45</td><td>81</td><td>60</td><td>68</td><td>48</td><td>50</td><td>70</td></tr> </table>	x	68	64	75	50	64	80	75	40	55	64	y	62	58	68	45	81	60	68	48	50	70	5	CL3	CO4
x	68	64	75	50	64	80	75	40	55	64															
y	62	58	68	45	81	60	68	48	50	70															
	<p>c</p> <p>Maximize <math>Z=2x+4y</math> subject to the constraints <math>3x+y \leq 22</math>, <math>2x+3y \leq 4</math>, <math>x \geq 0, y \geq 0</math> using Simplex method.</p>	5	CL3	CO4																					

**Module -V**

Q. No.	Questions	Mar ks	Bloom' s Level	CO No.															
3 .	a) Define the terms: i) Null hypothesis ii) Type-I and Type-II error iii) Confidence limits iv) Significance level.	5	CL3	CO5															
	b) Two horses A and B were tested according to the time (in sec) to run a particular race with the following results. Test whether you can discriminate between the two horses. ( $t_{0.05} = 2.2$ for 11 d. f)	5	CL3	CO5															
	<table border="1"> <tr><td>Horse A</td><td>28</td><td>30</td><td>32</td><td>33</td><td>33</td><td>29</td><td>34</td></tr> <tr><td>Horse B</td><td>29</td><td>30</td><td>30</td><td>24</td><td>27</td><td>29</td><td></td></tr> </table>	Horse A	28	30	32	33	33	29	34	Horse B	29	30	30	24	27	29			
Horse A	28	30	32	33	33	29	34												
Horse B	29	30	30	24	27	29													
4	c) The mean of two large samples of 1000 and 2000 members are 168.75 and 170 respectively. Can the samples be regarded as drawn from the same population of standard deviation 6.25?	5	CL3	CO5															

**OR**

4	a) A certain stimulus is administered to each of the 12 patients resulted in the following change in the blood pressure 5,3,8,-1,3,0,6,-2,1,5,0,4 . Can it be concluded that the stimulus will increase the blood pressure? (given $t_{0.05}$ for 11 d.f is 2.201)	5	CL3	CO5											
	b) Four coins are tossed 100 times and the following results were obtained:	5	CL3	CO5											
	<table border="1"> <tr><td>No. of heads</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr> <tr><td>Frequency</td><td>5</td><td>29</td><td>36</td><td>25</td><td>5</td></tr> </table> Fit a binomial distribution for the data and test the goodness of fit ( $\chi^2_{0.05} = 9.49$ for 4 d. f)	No. of heads	0	1	2	3	4	Frequency	5	29	36	25	5		
No. of heads	0	1	2	3	4										
Frequency	5	29	36	25	5										
4	c) Two types of batteries are tested for their length of life and following results were obtained	5	CL3	CO5											
	<table border="1"> <tr><th></th><th>No. of Batteries</th><th>Mean</th><th>Variance</th></tr> <tr><td>Battery A</td><td>10</td><td>500 hours</td><td>100</td></tr> <tr><td>Battery B</td><td>10</td><td>560 hours</td><td>121</td></tr> </table> Compute student's t and test whether there is a significant difference between two means. ( $t_{0.05}=2.086$ for 20 d.f)		No. of Batteries	Mean	Variance	Battery A	10	500 hours	100	Battery B	10	560 hours	121		
	No. of Batteries	Mean	Variance												
Battery A	10	500 hours	100												
Battery B	10	560 hours	121												

**Cognitive Levels of Bloom's Taxonomy**

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

**Course Outcomes**

CO1	Construct analytical functions to solve problems in electromagnetic field theory	CL3
CO2	Utilize basic concepts of Graph theory to develop algorithms of prefix codes.	CL3
CO3	Illustrate Discrete and Continuous random variables and Probability distribution functions to analyse the probability models in engineering field	CL3
CO4	Validate hypothesis testing and apply the Principles of Sampling to infer the nature of population	CL3
CO5	Solve LPP and use correlation and regression analysis to fit a Mathematical model for statistical data.	CL3

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**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
An Autonomous Institution

Department of Computer Science & Engineering  
B.E in Computer Science & Engineering (Cyber Security)

Continuous Internal Evaluation Test I - Even Semester 2022 - 23

Course Title: Embedded System Concepts with ARM	Course Code: 21CS42
Date: 14/06/2023	Time: 3.00PM – 04.15 PM
Faculty: Mr. Kishore Kumar, Mr. Raghvendra Sooda, Mrs. Srividya, Dr. Priya Kamath	Max. Marks: 30

(Descriptive Questions) - Answer any TWO full questions, choosing one full question from each module

**Module - 1**

Q. No.	Questions	Marks	Bloom's Level	CO No.
1	a. Bring out the Classification of Embedded systems with an example.	10	CL2	CO1
	b. Explain the Functional block diagram of a Typical Washing machine.	10	CL2	CO1

**OR**

2	a. Describe the following with respect to Quality Attributes. i) Response ii) Throughput iii) Testability iv) Portability v) Time to prototype	10	CL2	CO1
2	b. Define Embedded system. Compare Embedded system with General Computing System.	10	CL2	CO1

**Module - 2**

Q. No.	Questions	Marks	Bloom's Level	CO No.
3	a. Explain the RISC Design Philosophy	5	CL2	CO2
	b. Describe Embedded System Hardware with a neat diagram.	5	CL2	CO2
4	a. Discuss the Memory Characteristics of an Embedded system .	5	CL2	CO2
	b. Explain ARM Design Philosophy	5	CL2	CO2

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**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
An Autonomous Institution

Department of Computer Science & Engineering(Cyber Security)

Continuous Internal Evaluation Test II - Even Semester 2022 - 23

Course Title: Embedded System Concepts with ARM		Course Code: 21CS42
Date: 20/7/2023	Time: 3.00 PM – 4.15 PM	Semester: IV
Faculty: Mr. Kishore kumar		Max. Marks: 30

Answer one full question from each module.

**Module - 2**

Q. No.	Questions	Marks	Bloom's Level	CO No.
1 a.	Sketch and explain ARM core dataflow model and Registers available in user mode.	10	CL3	CO2
2 a.	Sketch and explain ARM processor modes, Complete ARM register set, a generic program status register.	10	CL3	CO2

**Module - 3**

Q. No.	Questions	Marks	Bloom's Level	CO No.
3 a.	Illustrate the operation of the following instructions and status of the zero and carry flag registers (Before Execution, Assume R5=0x87659F69, R7=0x6587699F, R4=0X02. Carry flag=0, zero flag=1) a) ADDCCS R7, R5, ASR R4 b) RSCCCS R5, R7, LSL R4 c) TSTCC R5, R7, LSR R4 d) SMULLCC R7, R3, R5, R4	10	CL3	CO3
	b) Write an ALP count the number of ones and zeros in given 32 bit variable(which is available in memory)	10	CL3	CO3

**OR**

4 a.	Illustrate the operation of the following instructions. a) BL subroutine b) LDRSH R3, [R1, R2]! c) STRH R1, [R3,#04] d) LDMIA R1!, {R3-R7}	10	CL3	CO3
b	Write an ALP sort an array in ascending order.	10	CL3	CO3

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**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
An Autonomous Institution

Department of Computer Science & Engineering  
B.E in Computer Science & Engineering

Continuous Internal Evaluation Test III- Even Semester 2022 - 23

<b>Course Title :</b> Embedded System Concepts with ARM		<b>Course Code :</b> 21CS42
<b>Date :</b> 21/08/2023	<b>Time :</b> 3.00PM – 04.15 PM	<b>Semester :</b> IV A, B, C & CY
<b>Faculty:</b> Mr. Kishore Kumar, Mr. Raghvendra Sooda, Mrs. Srividya, Dr. Priya Kamath		<b>Max. Marks :</b> 30

**Answer any TWO full questions, choosing one full question from each module**

**Module - IV**

Q. No.	Questions		Marks	Bloom's Level	CO No.
1	a.	Illustrate On- Board Communication Interface with SPI.	8	CL3	CO4
	b.	Describe the working of 7 SEGMENT display of common cathode with neat diagram.	7	CL2	CO4

**OR**

2	a.	Explain the driver interface of Stepper motor in Stepping modes i) FULL STEP ii) HALF STEP iii) WAVE STEP with neat diagram.	8	CL3	CO4
	b.	Write short notes on i) watch dog timer ii) RS-232 iii) Zig bee iv) IEEE 1394	7	CL2	CO4

**Module - V**

Q. No.	Questions		Marks	Bloom's Level	CO No.
3	a.	Define RTOS? Explain the basic functions of Real Time Kernel.	8	CL2	CO5
	b.	Illustrate the role of device drivers in Embedded OS based products.	7	CL3	CO5
4	a.	Discuss the various hardware debugging tools used in Embedded product development.	8	CL2	CO5
	b.	Illustrate the In System Programming with SPI Protocol.	7	CL3	CO5

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An Autonomous Institution

**Department of Computer Science & Engineering**  
**B.E in Computer Science & Engineering**

**Continuous Internal Evaluation Test I - EVEN Semester 2022 - 23**

Course Title: Operating Systems

Course Code: 21CS43

Date: 15/06/2023

Time: 9.00 AM – 10.15 AM

Semester : IV A,B,C & CY

Faculty: Mr. Harisha, Ms. Prapulla G, Mr. G B Janardhana Swamy, Ms. Alakananda K

Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each Module.**

**Module 1**

Q. No.	Questions		Marks	Bloom's Level	CO No.
1	a	Explain process Termination. Design a C code for the given sequence 2 4 1 4 1 4 3 4 using process termination system call exit () & Return 0 and draw the flow diagram	10	CL3	CO1
	b	Explain any 5 computing environments of the operating system	10	CL2	CO1

**OR**

2	a	i. Explain Process Control Block with a neat diagram. ii. How many processes are created by the below program? <pre>#include &lt;stdio.h&gt; #include &lt;unistd.h&gt; int main(){ int i; for(i=4;i&gt;0;i--) fork(); printf("Hello\n"); return 0; }</pre>	10	CL3	CO1
	b	Explain the following I. The different states the process. ii. Multi Programming. iii. Multitasking.			

**Module 2**

3	a	Illustrate the issues that comes with multithreaded programming.	10	CL3	CO2
<b>OR</b>					
4	a	Illustrate the windows threads with a programming example.	10	CL3	CO2

**Cognitive Levels of Bloom's Taxonomy**

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

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An Autonomous Institution

**Department of Computer Science & Engineering**  
**B.E in Computer Science & Engineering**

**Continuous Internal Evaluation Test II - EVEN Semester 2022 - 23**

Course Title: Operating Systems	Course Code: 21CS43
Date: 21/07/2023	Time: 9.30 AM – 10.45 AM
Faculty: Mr. Harisha, Ms. Prapulla G, Mr. G B Janardhana Swamy, Ms. Alakananda K	Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each Module**

**Module 2**

Q. No.	Questions				Marks	Bloom's Level	CO No.																							
1	a	Explain multilevel feedback queue scheduling with diagram.			04	CL2	CO2																							
	b	Calculate average turnaround time and average waiting time for the below process snapshot by using FCFS, SRTF, Priority (Non-Preemptive).			06	CL3	CO2																							
		<table border="1"> <thead> <tr> <th>Process ID</th> <th>Arrival Time</th> <th>Burst Time</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>0</td> <td>4</td> <td>2</td> </tr> <tr> <td>P2</td> <td>1</td> <td>3</td> <td>3</td> </tr> <tr> <td>P3</td> <td>2</td> <td>1</td> <td>4</td> </tr> <tr> <td>P4</td> <td>3</td> <td>5</td> <td>5</td> </tr> <tr> <td>P5</td> <td>4</td> <td>2</td> <td>5</td> </tr> </tbody> </table>	Process ID	Arrival Time	Burst Time	Priority	P1	0	4	2	P2	1	3	3	P3	2	1	4	P4	3	5	5	P5	4	2	5				
Process ID	Arrival Time	Burst Time	Priority																											
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P2	1	3	3																											
P3	2	1	4																											
P4	3	5	5																											
P5	4	2	5																											

**OR**

2	a	Discuss CPU Schedulers with example			04	CL2	CO2																							
	b	Calculate average turnaround time and average waiting time for the below process snapshot by using SJF, Preemptive priority & Non-Preemptive priority.			06	CL3	CO2																							
		<table border="1"> <thead> <tr> <th>Process</th> <th>Arrival time</th> <th>Burst Time</th> <th>Priority</th> </tr> </thead> <tbody> <tr> <td>P1</td> <td>0</td> <td>10</td> <td>3</td> </tr> <tr> <td>P2</td> <td>2</td> <td>29</td> <td>2</td> </tr> <tr> <td>P3</td> <td>3</td> <td>3</td> <td>1</td> </tr> <tr> <td>P4</td> <td>4</td> <td>7</td> <td>4</td> </tr> <tr> <td>P5</td> <td>5</td> <td>12</td> <td>5</td> </tr> </tbody> </table>	Process	Arrival time	Burst Time	Priority	P1	0	10	3	P2	2	29	2	P3	3	3	1	P4	4	7	4	P5	5	12	5				
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P5	5	12	5																											

**Module 3**

3	a	Using Banker's algorithm determine whether the following system is in a safe state.			10	CL3	CO3																	
		<table border="1"> <thead> <tr> <th>Process</th> <th>Allocation a b c</th> <th>Maximum a b c</th> <th>Available a b c</th> </tr> </thead> <tbody> <tr> <td>p0</td> <td>0 1 0</td> <td>7 5 3</td> <td>3 3 2</td> </tr> <tr> <td>p1</td> <td>2 0 0</td> <td>3 2 2</td> <td></td> </tr> <tr> <td>p2</td> <td>3 0 2</td> <td>9 0 2</td> <td></td> </tr> <tr> <td>p3</td> <td>2 1 1</td> <td>2 2 2</td> <td></td> </tr> <tr> <td>p4</td> <td>0 0 0</td> <td>4 3 3</td> <td></td> </tr> </tbody> </table>					Process	Allocation a b c	Maximum a b c	Available 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
Process	Allocation a b c	Maximum a b c	Available a b c																					
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p1	2 0 0	3 2 2																						
p2	3 0 2	9 0 2																						
p3	2 1 1	2 2 2																						
p4	0 0 0	4 3 3																						

		If a request from a process P1 arrives for (1,0,2) can the request be granted immediately.			
	b	Illustrate the Producer -Consumer problem and solution using Semaphore.	10	CL2	CO3

OR

		Using Banker's algorithm determine whether the following system is in a safe state.																																																																																													
4	a	<table border="1"> <thead> <tr> <th rowspan="2">PROCESS</th> <th colspan="4">ALLOCATION</th> <th colspan="4">MAX</th> <th colspan="4">AVAILABLE</th> </tr> <tr> <th>A</th><th>B</th><th>C</th><th>D</th> <th>A</th><th>B</th><th>C</th><th>D</th> <th>A</th><th>B</th><th>C</th><th>D</th> </tr> </thead> <tbody> <tr> <td>P0</td><td>2</td><td>0</td><td>0</td><td>1</td> <td>4</td><td>2</td><td>1</td><td>2</td> <td>3</td><td>3</td><td>2</td><td>1</td> </tr> <tr> <td>P1</td><td>3</td><td>1</td><td>2</td><td>1</td> <td>5</td><td>2</td><td>5</td><td>2</td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>P2</td><td>2</td><td>1</td><td>0</td><td>3</td> <td>2</td><td>3</td><td>1</td><td>6</td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>P3</td><td>1</td><td>3</td><td>1</td><td>2</td> <td>1</td><td>4</td><td>2</td><td>4</td> <td></td><td></td><td></td><td></td> </tr> <tr> <td>P4</td><td>1</td><td>4</td><td>3</td><td>2</td> <td>3</td><td>6</td><td>6</td><td>5</td> <td></td><td></td><td></td><td></td> </tr> </tbody> </table>	PROCESS	ALLOCATION				MAX				AVAILABLE				A	B	C	D	A	B	C	D	A	B	C	D	P0	2	0	0	1	4	2	1	2	3	3	2	1	P1	3	1	2	1	5	2	5	2					P2	2	1	0	3	2	3	1	6					P3	1	3	1	2	1	4	2	4					P4	1	4	3	2	3	6	6	5					10	CL3	CO3
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If process P2 requests (0,1,1,3) resources can it be granted immediately.																																																																																															
b Explain schematic view of monitors.	10	CL2	CO3																																																																																												

#### Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

#### Course Outcomes

CO1	Illustrate the operating system, its components, and the ideas behind system calls and inter-process communication.	CL3
CO2	Apply the concepts of multithreading and demonstrate various algorithms by considering different scheduling criteria.	CL3
CO3	Illustrate the process synchronization, its classical approaches and discuss the concepts of deadlock.	CL3
CO4	Apply the concept of memory management, demand paging, and demonstrate the working of various page replacement algorithms and file system operations.	CL3
CO5	Analyse the structure of mass storage devices, various disk scheduling techniques and concepts of operating system protection.	CL4

USN 4 S F 2 1 C 4 0 4 2



**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
An Autonomous Institution

**Department of Computer Science & Engineering**  
**B.E in Computer Science & Engineering**

**Continuous Internal Evaluation Test III - EVEN Semester 2022 - 23**

Course Title: Operating System	Course Code: 21CS43
Date: 22/08/2023	Time: 9.30AM-10.45AM
Faculty: Mr. Harisha, Miss.Prapulla G, Mr.G.B. Janardhana Swamy, Miss. Alakananda	Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each module.**

**Module 4**

Q. No.	Questions	Marks	Bloom's Level	CO No.
1	a Differentiate between single level directory structure and two-level directory structures. What are its advantages and disadvantages?	7	CL2	CO4
	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 4 memory frames, calculate how many page faults would occur in case of i. Optimal ii. LRU	8	CL3	CO4

**OR**

a	Describe Steps in Handling page faults with suitable block diagram and explain each step.	7	CL2	CO4
b	Consider the following page reference stream: 2, 3, 5, 6, 3, 8, 3, 1, 6, 8, 3, 8, 6, 5, 6, 3, 5, 2, 3, 5, 10, 12, 9. Calculate How many page faults would occur using FIFO, LRU and optimal page replacement algorithms assuming 4 frames? Which one of the above is most efficient?	8	CL3	CO4

**Module 5**

a.	Explain in detail about overview of mass storage structure.	7	CL2	CO5
b	Illustrate the various Disk Scheduling algorithms when a disk has 200 tracks and read-write arm starts from 19. The pending tracks are 30, 70, 115, 130, 110, 80, 20, 25. Calculate the seek time for each algorithm.	8	CL3	CO5

**OR**

a	Explain access matrix? Explain the different methods of implementing the access matrix.	7	CL2	CO5
b	A disk drive has 5000 cylinders from 0 to 4999. Currently the drive is at 143rd cylinder, and the previous request was at cylinder 125. Queue of pending requests in FIFO order 3186, 1470, 913, 1774, 948, 1509, 1022, 130. Calculate the total distance the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms from current position i) FCFS ii) SCAN iii)CSCAN.	8	CL3	CO5

USN 4 S F 2 1 C 4 0 4 2



**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
An Autonomous Institution

**Department of Computer Science & Engineering**

**Continuous Internal Evaluation Test I - EVEN Semester 2022 - 23**

Course Title: Design and Analysis of Algorithms	Course Code: 21CS44
Date: 15/06/2023	Time: 3.00 PM – 4.15 PM
Faculty: Ms Shiji Abraham	Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each module.**

**Module – 1**

Q. No.	Questions	Marks	Bloom's Level	CO No.
1	a Explain an algorithm to find uniqueness of elements in an array and give the mathematical analysis of this non recursive algorithm with steps.	10	CL2	CO1
	b Give the definition of an algorithm? Explain different ways to specify the algorithm.	05	CL2	CO1
	c Design an algorithm for performing string matching and compute efficiency.	05	CL3	CO1

**OR**

2	a	Explain the fundamental steps required for solving the Algorithm.	10	CL2	CO1
	b	Explain the selection sort algorithm and analyze its efficiency.	05	CL2	CO1
	c	Compute the efficiency of factorial of a number using mathematical analysis of recursive algorithm with steps.	05	CL3	CO1

**Module – 2**

3	a.	Explain divide and conquer technique with general algorithm.	05	CL2	CO2
	b.	Explain substitution method and solve the following equation using substitution method: $T(n)=4T(n/2) + n$	05	CL3	CO2

**OR**

4	a	Explain divide and conquer method of finding maximum and minimum element of the list.	05	CL2	CO2
	b.	Explain Master's theorem and solve the following equation using Master's theorem: $T(n)=2T(n/2) + n$	05	CL3	CO2

USN 4 S F 2 1 C 4 0 4 2



**SAHYADRI**  
COLLEGE OF ENGINEERING & MANAGEMENT  
An Autonomous Institution

**Department of Computer Science & Engineering**

**Continuous Internal Evaluation Test II - EVEN Semester 2022 - 23**

Course Title: Design and Analysis of Algorithms

Course Code: 21CS44

Date: 21/07/2023

Time: 3.00 PM – 4.15 PM

Semester: IV (A, B, C, CY)

Faculty: Ms. Ashwini CS, Ms. Parashakthi S, Mrs. Vidya V V, Ms. Shiji Abraham

Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each module.**

**Module – 2**

Q. No.	Questions	Marks	Bloom's Level	CO No.
1	a Explain merge sort algorithm for sorting using divide and conquer.	05	CL2	CO2
	b Apply topological sort on the following graph using source removal method.	05	CL3	CO2

**OR**

2	a	Explain algorithm for binary Search and trace the algorithm by using following set of numbers 3,14,27,31,39,42,55,70,74,81,85,93,98 and Search key is 70	05	CL2	CO2
	b	Explain an algorithm for performing quicksort, apply the same to sort the following set of numbers 5,3,1,9,8,2,4,7.	05	CL3	CO2

**Module – 3**

3	a.	Explain minimum spanning tree. Write Prim's algorithm to find minimum spanning tree. Apply the same on the following graph:	10	CL3	CO3
	b.	Apply greedy job sequencing algorithm for finding the optimal solution for given problem n=4, profits [10,30,60,40], deadlines [2,3,1,3]	05	CL3	CO3
	c.	Design of Huffman code for the following data.	05	CL3	CO3

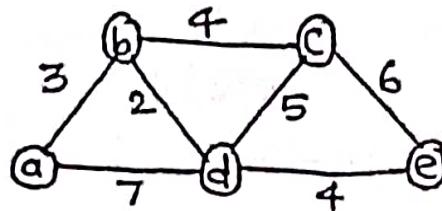
Character	A	M	R	-
Probability	0.4	0.2	0.3	0.1

a) Encode the text. RAMA\_RAMAR using Huffman code.

b) Decode the text whose encoding is 1000101.

OR

4 a Explain Dijkstra's algorithm and apply same to find the shortest path for the following graph



10

CL3

CO3

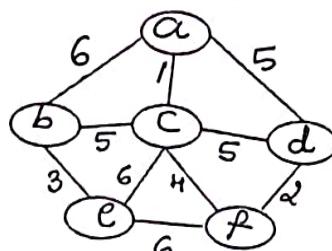
b. Solve the optimal solution for the Knapsack instances  $M=15, n=7$   
 $(P1, P2, P3, P4, P5, P6, P7) = (10, 5, 15, 7, 6, 18, 3)$   
 $(w1, w2, w3, w4, w5, w6, w7) = (2, 3, 5, 7, 1, 4, 1)$

05

CL3

CO3

c. Solve the following graph by using Kruskal's algorithm



05

CL3

CO3

### Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

### Course Outcomes

CO1	Solve the time complexity of recursive, non-recursive and brute force algorithm using asymptotic notations.	CL3
CO2	Solve the recurrence relation to obtain the performance of divide-and-conquer, decrease-and conquer approach.	CL3
CO3	Apply greedy technique, transform and conquer strategy to solve the problem for optimal solution.	CL3
CO4	Determine the time complexity for Dynamic-Programming paradigm and String-matching techniques.	CL3
CO5	Apply backtracking and branch-and-bound approach on combinatorial problems and categorize algorithms as P, NP, NP-complete and NP-hard classes.	CL3



**Department of Computer Science & Engineering**

**Continuous Internal Evaluation Test III - EVEN Semester 2022 - 23**

Course Title: Design and Analysis of Algorithms		Course Code: 21CS44
Date: 22/08/2023	Time: 3.00 PM – 4.15 PM	Semester: IV (A, B, C, CY)
Faculty: Ms. Ashwini CS, Ms. Parashakthi S, Mrs. Vidya V V, Ms. Shiji Abraham		Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each module.**

**Module – 4**

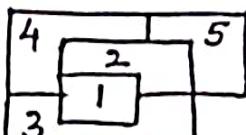
Q. No.	Questions	Marks	Bloom's Level	CO No.										
1 a	Apply Floyd's algorithm to solve all pair shortest path for the given graph.  	08	CL3	CO4										
1 b	Apply an algorithm to construct an optimal binary search tree for the set of key  <table border="1"> <tr> <td>Key</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> </tr> <tr> <td>Probability</td> <td>0.1</td> <td>0.2</td> <td>0.4</td> <td>0.3</td> </tr> </table>	Key	A	B	C	D	Probability	0.1	0.2	0.4	0.3	07	CL3	CO4
Key	A	B	C	D										
Probability	0.1	0.2	0.4	0.3										

**OR**

2 a	Design an algorithm to solve knapsack problem using dynamic programming. Apply the same to solve the following knapsack problem where W= 50.  <table border="1"> <tr> <th>Item</th><th>Weight</th><th>Value</th></tr> <tr> <td>1</td><td>10</td><td>60</td></tr> <tr> <td>2</td><td>20</td><td>100</td></tr> <tr> <td>3</td><td>30</td><td>120</td></tr> </table>	Item	Weight	Value	1	10	60	2	20	100	3	30	120	08	CL3	CO4
Item	Weight	Value														
1	10	60														
2	20	100														
3	30	120														
2 b	Apply dynamic programming approach to solve the given Travelling Salesman problem.  	07	CL3	CO4												
<b>Module – 5</b>																
3 a	Apply branch and bound approach to the assignment problem.	05	CL3	CO5												

		<p>Job1 Job2 Job3 Job4</p> <table border="1"> <tr> <td>a</td><td>9</td><td>2</td><td>7</td><td>8</td></tr> <tr> <td>b</td><td>6</td><td>4</td><td>3</td><td>7</td></tr> <tr> <td>c</td><td>5</td><td>8</td><td>1</td><td>8</td></tr> <tr> <td>d</td><td>7</td><td>6</td><td>9</td><td>4</td></tr> </table>	a	9	2	7	8	b	6	4	3	7	c	5	8	1	8	d	7	6	9	4		
a	9	2	7	8																				
b	6	4	3	7																				
c	5	8	1	8																				
d	7	6	9	4																				
	b.	Apply backtracking to solve the below instance of sum of subset problem $S = \{5, 10, 12, 13, 15, 18\}$ $d = 30$ .	05	CL3	C05																			
	c	Explain the classes of NP-Hard and NP-Complete problems	05	CL2	C05																			

OR

4	a	Colour the region in the map by applying backtracking graph colour algorithm. Colour= {R, G, B, Y}	05	CL3	C05
	b.		05	CL3	C05
	c	Illustrate and apply N Queen's Problem using Back tracking to solve 4 Queen's problem	05	CL2	C05

#### Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

#### Course Outcomes

CO1	Solve the time complexity of recursive, non-recursive and brute force algorithm using asymptotic notations.	CL3
CO2	Solve the recurrence relation to obtain the performance of divide-and-conquer, decrease-and conquer approach.	CL3
CO3	Apply greedy technique, transform and conquer strategy to solve the problem for optimal solution.	CL3
CO4	Determine the time complexity for Dynamic-Programming paradigm and String-matching techniques.	CL3
CO5	Apply backtracking and branch-and-bound approach on combinatorial problems and categorize algorithms as P, NP, NP-complete and NP-hard classes.	CL3

USN 4 S F E I C Y O 4 2



## Sahyadri College of Engineering & Management, Mangaluru

### Continuous Internal Evaluation Test I – Even Semester 2022 - 23

Course Title: Biology for Engineers		Course Code: 21BE45
Date: 16/06/2023	Time: 03:00 PM – 04:15 PM	Sem / Branch: IV/All Department
Faculty: Mr. Manishchandra P G, Mr. B.C Pramod, Mrs. Sharel		Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each module.**

#### Module - 1

Q. No.	Questions	Marks	Bloom's Level	CO No.
1	a. Explain the characteristics of cell.	05	CL2	CO1
	b. Explain plant cell with neat labelled diagram.	10	CL2	CO1
	c. Explain different type of plant. <i>Cells</i>	05	CL2	CO1

#### OR

2	a. Explain PNS (Peripheral nervous system).	05	CL2	CO1
2	b. Describe human brain with neat labelled diagram.	10	CL2	CO1
2	c. Differentiate spinal cord and vertebral column.	05	CL2	CO1

#### Module - 2

Q. No.	Questions	Marks	Bloom's Level	CO No.
3	a. Differentiate infectious and non-infectious diseases.	5	CL2	CO2
	b. Discuss in brief about Typhoid.	5	CL2	CO2

#### OR

4	a. Explain life cycle of malarial parasite.	5	CL2	CO2
4	b. Explain in brief the experiment performed by Louis Pasteur for rabies vaccine.	5	CL2	CO2

#### Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

USN 4 S F 2 1 C 4 0 4 8



Sahyadri College of Engineering & Management, Mangaluru

Continuous Internal Evaluation Test II – Even Semester 2022 - 23

Course Title: Biology for Engineers

Course Code: 21BE45

Date: 22/07/2023

Time: 03:00 PM – 04:15 PM

Sem / Branch: IV/All Department

Faculty: Mr. Manishchandra P G, Mr. B.C Pramod, Mrs. Sharel

Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each module.**

**Module - 2**

Q. No.	Questions		Marks	Bloom's Level	CO No.
1	a.	Explain the steps involved in action of mRNA vaccine.	05	CL2	CO2
	b.	Discuss in brief about Engineering solution for Parkinson's Disease.	05	CL2	CO2

**OR**

2	a.	Explain the steps involved in DNA fingerprinting.	05	CL2	CO2
	b.	Define CVD. Explain Coronary heart disease and stroke.	05	CL2	CO2

**Module – 3**

Q. No.	Questions		Marks	Bloom's Level	CO No.
3	a.	Define biosensor. Explain the components of biosensors.	10	CL2	CO3
	b.	Explain the working principle of biosensors and basic characteristics of biosensors.	10	CL2	CO3

**OR**

4	a.	Define telemedicine. Explain the block diagram of telemedicine.	10	CL2	CO3
	b.	Explain the benefits of telemedicine.	10	CL2	CO3

**Cognitive Levels of Bloom's Taxonomy**

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create

USN	4	S	F	2	1	C	4	D	4	2
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## Sahyadri College of Engineering & Management, Mangaluru

### Continuous Internal Evaluation Test III – Even Semester 2022 - 23

Course Title: Biology for Engineers

Course Code: 21BE45

Date: 23/08/2023

Time: 03:00 PM – 04:15 PM

Sem / Branch: IV/All Department

Faculty: Mr. Manishchandra P G, Mr. B.C Pramod, Mrs. Sharel

Max. Marks: 30

**Note: Answer any TWO full questions, choosing one full question from each module.**

#### Module - 4

Q. No.	Questions		Marks	Bloom's Level	CO No.
1	a.	Define biomechanics of joints. Explain the functions of joints.	05	CL2	CO4
	b.	Explain the modeling blood flow in the blood vessels.	10	CL2	CO4

**OR**

Q. No.	Questions		Marks	Bloom's Level	CO No.
2	a.	Define Bio-functionality and Bio-compatibility.	05	CL2	CO4
	b.	List the various metals used in the human body as biomaterial and explain their advantages and disadvantages.	10	CL2	CO4

#### Module – 5

Q. No.	Questions		Marks	Bloom's Level	CO No.
3	a.	Describe the role of AI in various healthcare sectors and explain its classifications.	05	CL2	CO5
	b.	Explain Briefly the application of AI in Genetic Algorithm.	10	CL2	CO5

**OR**

Q. No.	Questions		Marks	Bloom's Level	CO No.
4	a.	Briefly describe how AI is being used in drug discovery.	05	CL2	CO5
	b.	Explain briefly the application of AI in Imaging and Computer-aided Diagnosis.	10	CL2	CO5

#### Cognitive Levels of Bloom's Taxonomy

No.	CL1	CL2	CL3	CL4	CL5	CL6
Level	Remember	Understand	Apply	Analyze	Evaluate	Create