TAMIL NADU OPEN UNIVERSITY
Chennai – 600 015
Name of the School
HOME ASSIGNMENT

Programme Code	: 131
Programme Name	: B.Sc., (Mathematics)
Course Code	: BMS31
Course Name	: Real and Complex Analysis
Batch	:
No. of Assignment	: 04
Maximum CIA	: 25 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max:25 Marks.

Answer any ONE of the following three questions.

1. State and prove Baire's Category theorem.

2. Prove that $f \in \mathfrak{R}$ on [a, b] if and only if for any $\varepsilon > 0$ there exists a partition P such that $U(P, f) - L(P, f) < \varepsilon$

3. State and Prove Cauchy's integral theorem for rectangle.

ASSIGNMENT-2

Max:25 Marks.

Answer any ONE of the following three questions:

1. Define a complete metric space and prove that C, the set of all complex numbers, with usual metric is complete.

2. Define Riemann integrable function and prove that every continuous function on a closed interval is Riemann integrable.

3. Derive the necessary and sufficient condition for $f(z)$ to be analytic in a domain D **.**

ASSIGNMENT-3

Max:25 Marks.

Answer any ONE of the following three questions.

1. State and prove Cantor's Intersection theorem.

2. Prove that ι_2, the set of all sequences (x_n) such that $\sum_{n=1}^{\infty}|x_n|^2$ is convergent, is complete.

3. State and Prove Laurent's theorem.

ASSIGNMENT-4

Max:25 Marks.

Answer any ONE of the following three questions.

1. State and prove Heine Borel Theorem.

2. Prove that the set of all rational numbers Q is countable, proving a necessary result.

3. Show that $\int_0^\infty \frac{sinx}{x}\,dx = \frac{\pi}{2}$.

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Name of the School

HOME ASSIGNMENT

Programme Code	:	131
Programme Name	:	B.Sc., (Mathematics)
Course Code	:	BMS32
Course Name	:	Linear Algebra and Boolean Algebra
Batch	:	
No. of Assignment	:	04
Maximum CIA	:	25 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max:25 Marks.

Answer any ONE of the following three questions.

1. Let V be a vector space over F. Let S = $\{v_1, v_2, \ldots, v_n\}$ and L(S) = W. Show that there exists a linearly independent subset S′ of S such that L(S′) = W.

2. Reduce the quadratic form $x_1^2 + 2x_2^2 - 7x_3^2 - 4x_1x_2 + 8x_1x_3$ to the diagonal form.

3. Prove that the set of all normal subgroups of a group is a modular lattice.

ASSIGNMENT-2

Max:25 Marks.

Answer any ONE of the following three questions:

1. Let A and B be subspace of a vector space V. Then prove that $A \cap B = \{0\}$ if and only if every vector $v \in A + B$ can be uniquely expressed in the form v = a + b where $a \in A$ and $b \in B$.

2. Define an inner product space, give an example, define a norm on it and prove the properties of this norm.

3. Define a lattice, a chain and prove that every chain is a lattice.

ASSIGNMENT-3

Max:25 Marks.

Answer any ONE of the following three questions.

1. Prove that two finite dimensional vector spaces V and W over a field F are isomorphic if and only if they have the same dimension.
2. Prove that L(S) is the smallest subspace of V containing S where S is a nonempty subset of V.
3. If $\langle L, \leq \rangle$ is a lattice, then for any a, b, c $\in$L, prove that
   $a \leq b \Leftrightarrow a * b = a \Leftrightarrow a \bigoplus b = b$

ASSIGNMENT-4

Max:25 Marks.

Answer any ONE of the following three questions.

1. Let V be a vector space over a field F and A and B subspaces of V. Then show that
   $\frac{A+B}{A} \cong \frac{B}{A \bigcap B}$.
2. Explain Gram Schmidt orthogonalisation process.
3. State and prove Demorgan's laws in Boolean algebra.

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HOME ASSIGNMENT

Programme Code	:	131
Programme Name	:	B.Sc., (Mathematics)
Course Code	:	BMS33N
Course Name	:	Optimization Technique
Batch	:	
No. of Assignment	:	04
Maximum CIA	:	25 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max:25 Marks.

Answer any ONE of the following three questions.

1. Use Two-phase simplex method to solve

$$\text{Maximize } Z = 5x_1 + 8x_2$$

$$\text{subject to } \quad 3x_1 + 2x_2 \geq 3$$

$$x_1 + 4x_2 \geq 4$$

$$x_1 + x_2 \leq 5$$

$$x_1, x_2 \geq 0$$

2. Solve following transportation problem.

	1	2	3	4	Supply
I	21	16	25	13	**11**
II	17	18	14	23	**13**
III	32	27	18	41	**19**
Demand	**6**	**10**	**12**	15	

3. Use the motion of dominance to simply the rectangular game with the following payoff, and solve it graphically.

Player K

		I	II	III	IV
	1	18	4	6	4
Player L	2	6	2	13	7
	3	11	5	17	3
	4	7	6	12	2

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ASSIGNMENT-2

Max:25 Marks.

Answer any ONE of the following three questions:

1. Prove Use simplex method to solve the LPP

$Max. Z = 3x_1 + 2x_2 + 5x_3$

Subject to:

$x_1 + 2x_2 + x_3 \leq 43$

$3x_1 + 2x_3 \leq 46$

$x_1 + 4x_2 \leq 42$

$x_1, x_2, x_3 \geq 0$.

2. State Solve the following travelling salesman problem.

	A	B	C	D	E
A	-	3	6	2	3
B	3	-	5	2	3
C	6	5	-	6	4
D	2	2	6	-	6
E	3	3	4	6	-

3. A contractor has to supply 10,000 bearings per day to an automobile manufacturer. He finds that, when he starts a production run, he can produce 25,000 bearings per day. The cost of holding a bearing in stock for one year is 20 paise and the set up cost of a production run is Rs. 180. How frequently should production run be made?

ASSIGNMENT-3

Max:25 Marks.

Answer any ONE of the following three questions.

1. Solve the following integer programming problem by Gomory's method:

$Max.Z = 7x_1 + 5x_2$

Subject to: $x_1 + x_2 \leq 4$

$5x_1 + 3x_2 \leq 15$

$x_1, \ x_2 \ \geq 0$ and integers

2. A T.V. repairman finds that the spent on his jobs has an exponential distribution with mean 30 minutes. If the repairs sets in the order in which they come in. If the arrival of sets is approximately Poisson with an average rate of 10 per 8 hour day. What is the repairman's expected idle time each day? How many jobs ahead of the average set just brought in?

3. Using graphical method solve the following game

Player B

$$\text{Player A} \begin{bmatrix} 1 & -3 \\ 3 & 5 \\ -1 & 6 \\ 4 & 1 \\ 2 & 2 \\ -5 & 0 \end{bmatrix}$$

ASSIGNMENT-4

Max:25 Marks.

Answer any ONE of the following three questions.

1. Solve the following LPP

$$Maximize\ \ Z = 2x_1 + x_2 + x_3$$

$$subject\ to\qquad 4\,x_1 + 6x_2 + 3x_2 \le 8$$

$$3\,x_1 - 6x_2 - 4x_3 \le 1$$

$$2\,x_1 + 3x_2 - 5x_3 \ge 4$$

$$x_1,\ x_2,\ \ x_3 \ge 0$$

2. Reduce the following game by dominance and find the game value

	I	II	III	IV
I	3	2	4	0
Player A II	3	4	2	4
III	4	2	4	0
IV	0	4	0	8

3. A barbershop has space to accommodate only 10 customers. He can service only one person at a time. If a customer comes to his shop and finds it full, he goes to the next shop. Customers randomly, arrive at an average rate of $\lambda = 10$ per hours and the barbers service time is negative exponential with an average of $\frac{1}{\mu} = 5$ minutes per customer. Find $P_0,\ P_n$.

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HOME ASSIGNMENT

Programme Code	: 131
Programme Name	: B.Sc., (Mathematics)
Course Code	: BMS34
Course Name	: Programming in C and C++
Batch	:
No. of Assignment	: 04
Maximum CIA	: 25 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max:25 Marks.

Answer any ONE of the following three questions.

1. Explain the general form of any two control statements in C with examples.

2. Write a program to find the roots of a quadratic equation using a function and use it in the main program to manipulate the roots.

3. Write a note on operator overloading.

ASSIGNMENT-2

Max:25 Marks.

Answer any ONE of the following three questions:

1 Write a detailed note on input and output functions in C.

2. Write short notes on

a) Single Inheritance
b) Hierarchail Inheritance
c) ‘this’ pointer in C++

3. Write a note on Constructors and Destructors.

ASSIGNMENT-3

Max:25 Marks.

Answer any ONE of the following three questions.

1. Explain the following

(1) Error Handling during file operation.

(2) Opening and closing a file.

2. What is an algorithm? Write and explain an algorithm to find greatest number out of three given numbers.

3. Write a program in C to find the first *n* Fibonacci numbers.

ASSIGNMENT-4

Max:25 Marks.

Answer any ONE of the following three questions.

1 Explain briefly about formatted input with examples.

2. Write a program to read the marks of the students in a class and print their average and standard deviation.

3. Write short notes on single and multi-dimensional arrays.

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HOME ASSIGNMENT

Programme Code	: 131
Programme Name	: B.Sc., Sc., (Mathematics)
Course Code	: BMS35
Course Name	: Graph Theory
Batch	:
No. of Assignment	: 04
Maximum CIA	: 25 Marks (Average of total no. of Assignments)

ASSIGNMENT-1

Max:25 Marks.

Answer any ONE of the following three questions.

1. Explain a problem, give its graph model and explain the solution.

2. State and prove Five-colour theorem.

3. Define a tournament and prove that every tournament has a directed Hamilton Path.

ASSIGNMENT-2

Max:25 Marks.

Answer any ONE of the following three questions:

1 Let G be a (p, q) graph. Prove that the following statements are equivalent.

(i) G is a tree.

(ii) Every two points of G are joined by a unique path.

(iii) G is connected and $p = q + 1$.

(iv) G is acyclic and $p = q + 1$.

2. Prove that a graph is bipartite if and only if it contains no odd cycle.

3. State a necessary and sufficient conditions for connected graph to be eulerian..

ASSIGNMENT-3

Max:25 Marks.

Answer any ONE of the following three questions.

1. Prove that the maximum number of lines among all *p* point graphs with no triangle is $\left[\frac{p^2}{4}\right]$.

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2. (i) Prove that if G is a graph in which the degree of every vertex is at least two then G contains a cycle.

(***ii***) State and Prove Euler theorem.

3. (i) Prove that $\delta \leq \frac{2q}{p} \leq \Delta$

(***ii***) Show that the partition P = (6, 6, 5, 4, 3, 3, 1) is not graphic.

ASSIGNMENT-4

Max:25 Marks.

Answer any ONE of the following three questions.

1 If G is a graph with $p \geq 3$ vertices and $\delta \geq p/2$, then prove that G is Hamiltonian.

2. Prove that a partition $P = \{d_1, d_2, ..., d_p\}$ of even number into p parts with

$p-1 \geq d_1 \geq d_2 \geq d_3 \geq ... \geq d_p$ is graphical if and only if the modified partition

$P' = (d_2 - 1, d_3 - 1, ..., d_{i+1}, d_{i+2}, ...d_p)$ is graphical.

3. **(*i*)** Prove that any self-complementary graphs has $4n$ or $4n+1$ points.

(ii) Prove that in a graph G, any $u-v$ walk contains a $u-v$ path.
