| Lesson Plan No. 1 | Course Name: Discrete Mathematics<br>Topic: Operations and Laws of Sets | Course No.: BSC-401 |
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| **Objectives** | At the end of the lesson the student shall be able to:<br>a. Articulate the concept of Sets.<br>b. To learn about what are operations and laws of sets.<br>c. Understand about operations and laws of sets with the help of an example. |
| **Teaching Aids (if any)** | a. Chalk & talk<br>b. Group discussion |
| **Teaching Development** | 1. **Introduction** (5 minutes)<br>- Ask questions.<br>What is a set?<br>How can we represent sets in tabular and set-roaster form?<br>What are different types of sets?<br>What do you mean by universal set?<br>- Introduce the students with the concept and explain what a set is in a simple way.<br>- Talk about its applications.<br>- Introduce the formal definition of a set through NPTEL portal<br>- https://archive.nptel.ac.in/courses/111/106/111106086/<br>- Highlight the important characteristics of the sets and their types.<br>- Highlight the operations and important laws of sets.<br><br>2. **Development** (30 minutes)<br>a. Sets and their representation<br>- Introduce the concept of sets, their representation and their types<br>https://www.youtube.com/watch?v=oaOm2pnKkyY<br>b. Operations and Laws of Sets<br>- Introduce the concepts of union, intersection and complement of a set with the help of examples.<br>- Show Venn diagrams to illustrate the operations on sets.<br>- Give examples on different types of sets and how an operation on sets works.<br>c. Laws on Sets<br>- Associative Law<br>- Distributive Law<br>- De-Morgan's Law<br>- Generalized Form of laws<br>- Give various results on operations and laws of sets.<br>3. Exercise (5 minutes) –<br>Give different examples and problems related to operations and |

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| | laws of Sets. |
| **Closure** | 1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<br>2. Suggested Reading<br>- Sharma Publications : Set theory: Pg no 31-48<br>3. Homework<br>- Solve different problems on laws of sets and generalized results of family of sets.<br><br>Spend 5 minutes to wrap up and consolidate the learning's |
| **Evaluation** | 1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<br><br>Spend 5 minutes to evaluate student assimilation of the lesson contents |

| Lesson Plan No. 2 | Course Name: Discrete Mathematics<br>Topic: Introduction to Cartesian Products | Course No.: BSC-401 |
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| **Objectives** | At the end of the lesson the student shall be able to:<br>a. Articulate the concept of Cartesian product.<br>b. Able to solve some examples on the concept of Cartesian product. |
| **Teaching Aids (if any)** | a. Chalk & talk<br>b. Group discussion |
| **Teaching Development** | 1. **Introduction** (5 minutes)<br>- Ask questions.<br>- What is ordered pair?<br>- How we find ordered pairs from two sets?<br>- Introduce the students with the concept of Cartesian product.<br>- Talk about its applications.<br>- Explain why we need Cartesian product.<br>- Explain how to link pairs of objects from two sets.<br>- Introduce the students with the concept and explain what a set is in a simple way.<br>- Talk about its applications.<br>- Introduce the formal definition of a Cartesian Product through NPTEL portal<br>- https://archive.nptel.ac.in/courses/111/106/111106086/<br><br>2. **Development** (30 minutes)<br>a. Cartesian Product<br>- Introduce the concept of Cartesian product of a set<br>b. Examples and results on Cartesian product<br>- Give examples on ordered pairs, Cartesian product and results on Cartesian product involving three sets A, B and C.<br>- Give various results on operations and laws regarding Cartesian products.<br>3. Exercise (5 minutes) –<br>Give different problems to prove related to the Cartesian product. |
| **Closure** | 1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<br>2. Suggested Reading<br>https://www.sciencedirect.com/science/article/abs/pii/B9780128053041000114<br>3. Homework<br>- Solve different problems on Cartesian product to understand the term relations.<br>Spend 5 minutes to wrap up and consolidate the learning's |
| **Evaluation** | 1. Reflective Questions (What, Why, Who?). Allow students to answer |

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| | and discuss.<br><br>Spend 5 minutes to evaluate student assimilation of the lesson contents |

| Lesson Plan No. 3 | Course Name: Discrete Mathematics<br>Topic: Finite & Infinite Sets | Course No.: BSC-401 |
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| **Objectives** | At the end of the lesson the student shall be able to:<br>a. Understand the concept of finite set and infinite set.<br>b. Able to define and understand the concept of countable and uncountable set. |
| **Teaching Aids (if any)** | a. Chalk & talk |
| **Teaching Development** | 1. **Introduction** (5 minutes)<br>- Ask questions<br>- What are finite and infinite numbers?<br>- What are countable and uncountable numbers?<br>- Difference between finite and infinite numbers and countable and uncountable numbers.<br>2. **Development** (30 minutes)<br>a. Introduction of finite and infinite set, countable and uncountable set.<br>b. Explain the concept of finite set and infinite set.<br>c. Explain the concept of countable and uncountable set.<br>d. Explain the difference between finite set and countable set.<br>e. Explain various examples.<br>f. Explain the difference between infinite set and uncountable set.<br>g. Do various problems of countable and uncountable sets.<br>Web Link: **https://archive.nptel.ac.in/courses/111/106/111106086** |
| **Closure** | 1. Summarize the Lesson Learning Outcomes and get affirmation from students on these.<br>2. Covers the following:<br>What is finite and infinite set, countable and uncountable set?<br>3. Homework:<br>- Give some problems on finite and infinite set to solve.<br>- Give some problems on countable and uncountable sets to solve. |
| **Evaluation** | 1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<br>- Quiz based activity including MCQs<br>Spend 5 minutes to evaluate student assimilation of the lesson contents |

| Lesson Plan No. 4 | Course Name: Discrete Mathematics<br>Topic: Introduction to Binary Relations and its types | Course No.: BSC-401 |
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| **Objectives** | At the end of the lesson the student shall be able to:<br>a. Articulate the concept of Binary relation.<br>b. Able to define various types of relation.<br>c. Understand how to check type of relation through various problems. |
| **Teaching Aids (if any)** | a. Chalk & talk<br>b. Group discussion |
| **Teaching Development** | 1. **Introduction** (5 minutes)<br>- Ask questions<br>- What is an ordered pair?<br>- What is a binary relation?<br>- Difference between relations and sets.<br>- Introduce the formal definition of a Cartesian Product, different types of sets through NPTEL portal<br>- https://archive.nptel.ac.in/courses/111/106/111106086/<br><br>2. **Development** (30 minutes)<br>a. Introduce the concept of binary relation.<br>- Explain the concept of binary relation with examples.<br>- Explain various types of relation: reflexive, symmetric and transitive relation.<br>b. Explain the difference between reflexive, symmetric and transitive relation.<br>- Explain various examples.<br>c. Explain the concept of equivalence relation with the help of examples.<br>- Explain the concept of partition and partial order relation with examples and some results.<br><br>3. **Exercise** (10 minutes) –<br>- Do various problems on binary relation and its various types. |
| **Closure** | 1. Summarize the lesson learning outcomes and get affirmation from students on these.<br><br>2. Suggested video links:<br>https://www.youtube.com/watch?v=jZXHzpq-vmM<br><br>3. Homework:<br>- Give some problems on binary relation and its types to solve. |

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| | Spend 5 minutes to wrap up and consolidate the leanings. |
| **Evaluation** | 1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<br>- Quiz based activity including MCQs<br>Spend 5 minutes to evaluate student assimilation of the lesson contents. |

| Lesson Plan No. 5 | Course Name: Discrete Mathematics<br>Topic: Introduction to Functions & its types | Course No.: BSC-401 |
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| **Objectives** | At the end of the lesson the student shall be able to:<br>a. Articulate the concept of functions.<br>b. Able to define various types of functions.<br>c. Understand how to check type of function through various problems. |
| **Teaching Aids (if any)** | a. Chalk & talk<br>b. Group discussion |
| **Teaching Development** | 1. **Introduction** (5 minutes)<br>- Ask questions<br>- What is the image of a function?<br>- What is domain and co-domain of a function?<br>- Talk about its applications.<br>- Introduce the formal definition of functions and its types through NPTEL portal<br>2. **Development** (30 minutes)<br>a. Introduce the definition of function.<br>- Explain the concept of function.<br>- Explain various types of function: one-one and onto function.<br>- Explain the difference between one-one and onto function.<br>- Explain why every relation is not a function.<br>b. Explain the concept of Bijective function with the help of examples.<br>3. Exercise (10 minutes) –<br>- Do various problems on function and its various types. |
| **Closure** | 1. Summarize the lesson learning outcomes and get affirmation from students on these.<br>2. Suggested video links:<br>https://youtu.be/jZXHzpq-vmM<br>3. Covers the following:<br>What are function and its various types?<br>4. Homework:<br>- Give some problems on functions and its types to solve.<br>Spend 5 minutes to wrap up and consolidate the learnings. |
| **Evaluation** | 1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<br>Spend 5 minutes to evaluate student assimilation of the lesson contents. |

| Lesson Plan No.6 | Course Name: Discrete Mathematics<br>Topic: Principle of Mathematical Induction | Course No.: BSC-401 |
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| **Objectives** | At the end of the lesson the student shall be able to:<br>a. Articulate the concept of mathematical induction.<br>b. Understand how to find mathematical induction through various problems. |
| **Teaching Aids (if any)** | a. Chalk & talk |
| **Teaching Development** | 1. **Introduction** (5 minutes)<br>- Ask questions<br>- Tell them that principle of mathematical induction is a tool that is used to prove different kinds of mathematical statements.<br><br>2. **Development** (30 minutes)<br>a. Introduce the principle of mathematical induction.<br>- Explain the concept of principle of mathematical induction.<br>- Talk about its applications in various mathematical results.<br><br>b. Explain them that Mathematical Induction is a technique of proving a statement, theorem or formula which is thought to be true, for each and every natural number n with the help of examples.<br><br>3. Exercise (10 minutes) –<br>- Do various problems on principle of mathematical induction. |
| **Closure** | 1. Summarize the lesson learning outcomes and get affirmation from students on these.<br><br>2. Suggested video links:<br>https://www.youtube.com/watch?v=qJDieyIpRfI<br>3. Homework:<br>- Give some problems on principle of mathematical induction to solve.<br>Spend 5 minutes to wrap up and consolidate the learnings. |
| **Evaluation** | 1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<br>Spend 5 minutes to evaluate student assimilation of the lesson contents. |

| Lesson Plan No. 7 | Course Name: Discrete Mathematics<br>Topic: Principle of Inclusion & Exclusion | Course No.: BSC-401 |
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| **Objectives** | At the end of the lesson the student shall be able to:<br>a. Articulate the concept of principle of inclusion and exclusion.<br>b. Understand the concept through Venn diagram.<br>c. Able to find problems on principle of inclusion and exclusion. |
| **Teaching Aids (if any)** | a. Chalk & talk |
| **Teaching Development** | 1. **Introduction** (5 minutes)<br>- Ask questions<br>- What is union and intersection of two sets?<br>- When two sets are disjoint?<br>- Talk about representation of sets and operations of sets through Venn diagram<br>- Introduce the concept of principle of Exclsuion & Inclusion through NPTEL portal<br><br>2. **Development** (30 minutes)<br><br>a. Introduce the principle of inclusion and exclusion.<br>- Explain the concept of principle of inclusion and exclusion.<br>- Explain the concept through Venn diagram.<br>- Talk about its applications in combination and probability.<br><br>b. Explain the concept of principle of inclusion and exclusion for two sets and three sets with the help of examples.<br><br>2. Exercise (5 minutes) –<br>- Do various problems on principle of inclusion and exclusion. |
| **Closure** | 1. Summarize the lesson learning outcomes and get affirmation from students on these.<br><br>2. Suggested video links:<br>https://www.youtube.com/watch?v=As7cm17KI<br><br>3. Homework:<br>- Give some problems on principle of inclusion and exclusion to solve.<br>Spend 5 minutes to wrap up and consolidate the learnings. |
| **Evaluation** | 1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<br>Spend 5 minutes to evaluate student assimilation of the lesson contents. |

| Lesson Plan No. 8 | Course Name: Discrete Mathematics<br>Topic: Principle of Pigeonhole Principle | Course No.: BSC-401 |
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| **Objectives** | At the end of the lesson the student shall be able to:<br>a. Articulate the concept of Pigeonhole principle.<br>b. Able to find problems on Pigeonhole principle.<br>c. Talk about its applications in day-to-day life. |
| **Teaching Aids (if any)** | a. Chalk & talk |
| **Teaching Development** | 1. **Introduction** (5 minutes)<br>- Ask questions<br>- Introduce simple form of Pigeonhole principle.<br><br>2. **Development** (30 minutes)<br>a. Introduce Pigeonhole principle.<br>- Explain the concept of Pigeonhole principle.<br>- Explain how we use Pigeonhole principle to use problems.<br>- Talk about its applications in real world.<br>b. Explain the strong form of Pigeonhole principle with the help of examples.<br><br>2. Exercise (10 minutes) –<br>- Do various problems on Pigeonhole principle. |
| **Closure** | 1. Summarize the lesson learning outcomes and get affirmation from students on these.<br><br>2. Suggested video links:<br>https://www.digimat.in/nptel/courses/video/106106094/L27.html<br><br>3. Homework:<br>- Give some problems on Pigeonhole principle to solve.<br>Spend 5 minutes to wrap up and consolidate the leanings. |
| **Evaluation** | 1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss.<br>- Quiz based activity including MCQs<br>Spend 5 minutes to evaluate student assimilation of the lesson contents. |