

## LESSON PLAN

|                                 |                       |
|---------------------------------|-----------------------|
| Program Name                    | ELECTRICAL ENGG       |
| Course/Subject Name             | Applied Mathematics-I |
| Course/Subject Code             | BS-101                |
| Course/Subject Coordinator Name | Dr. Kirandeep Bala    |

### Evaluation scheme :

| S.No            | Subject Name          | Study scheme<br>(Hrs/Week) | Marks in evaluation scheme                                                                              |           |                     |           |
|-----------------|-----------------------|----------------------------|---------------------------------------------------------------------------------------------------------|-----------|---------------------|-----------|
|                 |                       |                            | Internal Assessment                                                                                     |           | External Assessment |           |
|                 |                       |                            | Theory                                                                                                  | Practical | Theory              | Practical |
| 1.              | Applied Mathematics-I | 4 (L: 3, T:1, P: 0)        | 50                                                                                                      | -         | 100                 | -         |
| Reference books |                       | (i)                        | Applied Mathematics - I & II for Diploma Courses, by R. D. Sharma, Dhanpat Rai Publications             |           |                     |           |
|                 |                       | (ii)                       | Mathematics for Class XI & XII, NCERT Publication, New Delhi.                                           |           |                     |           |
|                 |                       | (iii)                      | Higher Engineering Mathematics, by B.S. Grewal, Khanna Publishers, New Delhi, Latest Edition.           |           |                     |           |
|                 |                       | (iv)                       | Advanced Engineering Mathematics, by Reena Garg & Chandrika Prasad, Khanna Publishing House, New Delhi. |           |                     |           |

### Course Outcomes: After the completion of the course the student will be able to

|     |                                                                                                                                                                                                                                                                         |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1 | Explain and apply the concepts of angles, radian measure, allied angles, trigonometric identities, product formulae and graphs of sine and cosine functions to solve mathematical and engineering-related problems.                                                     |
| CO2 | Explain the concept of functions and limits, evaluate standard limits, and determine limits of algebraic functions using substitution, factorization and rationalization methods.                                                                                       |
| CO3 | Apply first-principle differentiation and the rules of differentiation, including sum, product, quotient and chain rules, to differentiate algebraic, trigonometric, inverse trigonometric and logarithmic functions.                                                   |
| CO4 | Apply the concepts and algebra of complex numbers, including conjugates, inverses, quadratic equations, Argand diagrams, modulus, amplitude and polar form, and resolve proper and improper rational fractions into partial fractions with non-repeated linear factors. |
| CO5 | Apply factorials, permutations and combinations, and use the binomial theorem for positive integral and general indices, including binomial approximations, to solve numerical and engineering-related problems.                                                        |

### Teaching Plan:

| Lecture No. | Name of topic                                                                        | Proposed Date | Actual Date | Remarks |
|-------------|--------------------------------------------------------------------------------------|---------------|-------------|---------|
| 1           | Unit 1: Basic Trigonometry – Concept of angles and measurement of angles in degrees  | 10-08-2026    |             |         |
| 2           | Measurement of angles in grades and radians                                          | 12-08-2026    |             |         |
| 3           | Conversions between degrees, grades and radians                                      | 14-08-2026    |             |         |
| 4           | Radian measure formula (Arc Length Formula in radians) and simple related problems   | 17-08-2026    |             |         |
| 5           | Ratios of allied angles (without proof)                                              | 19-08-2026    |             |         |
| 6           | Trigonometric formulae – sum formulae (without proof)                                | 21-08-2026    |             |         |
| 7           | Trigonometric formulae – difference formulae (without proof)                         | 22-08-2026    |             |         |
| 8           | Applications of sum and difference formulae                                          | 24-08-2026    |             |         |
| 9           | Product formulae – transformation of product to sum and difference                   | 28-08-2026    |             |         |
| 10          | Product formulae – transformation of sum and difference to product; related problems | 29-08-2026    |             |         |
| 11          | Graphs of $\sin x$                                                                   | 31-08-2026    |             |         |
| 12          | Graphs of $\cos x$                                                                   | 02-09-2026    |             |         |
| 13          | Unit 2: Functions and Limits – Definition of function and value of a function        | 04-09-2026    |             |         |
| 14          | Even and odd functions                                                               | 05-09-2026    |             |         |
| 15          | Function of a function                                                               | 07-09-2026    |             |         |
| 16          | Limit of a function – concept and notation                                           | 09-09-2026    |             |         |
| 17          | Standard limits (with proof) – first standard limit                                  | 11-09-2026    |             |         |
| 18          | Standard limits (with proof) – remaining standard limits                             | 12-09-2026    |             |         |

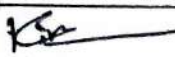
| Lecture No. | Name of topic                                                                                                   | Proposed Date | Actual Date | Remarks |
|-------------|-----------------------------------------------------------------------------------------------------------------|---------------|-------------|---------|
| 19          | Problems based on standard limits                                                                               | 14-09-2026    |             |         |
| 20          | Limit of an algebraic function by substitution method                                                           | 16-09-2026    |             |         |
| 21          | Limit of an algebraic function by factorization method                                                          | 18-09-2026    |             |         |
| 22          | Limit of an algebraic function by rationalization method                                                        | 19-09-2026    |             |         |
| 23          | Unit 3: Differentiation – Differentiation by first principle of $x(n)$                                          | 21-09-2026    |             |         |
| 24          | Differentiation by first principle of $\sin x$                                                                  | 23-09-2026    |             |         |
| 25          | Differentiation by first principle of $\cos x$                                                                  | 25-09-2026    |             |         |
| 26          | Rules of differentiation – sum rule                                                                             | 26-09-2026    |             |         |
| 27          | Rules of differentiation – product rule                                                                         | 28-09-2026    |             |         |
| 28          | Rules of differentiation – quotient rule                                                                        | 30-09-2026    |             |         |
| 29          | Chain rule – differentiation of function of a function                                                          | 03-10-2026    |             |         |
| 30          | Differentiation of trigonometric functions                                                                      | 05-10-2026    |             |         |
| 31          | Differentiation of inverse trigonometric functions                                                              | 07-10-2026    |             |         |
| 32          | Logarithmic differentiation                                                                                     | 09-10-2026    |             |         |
| 33          | Unit 4: Complex Numbers and Partial Fractions – Definition of complex numbers; real and imaginary parts         | 10-10-2026    |             |         |
| 34          | Conjugate of a complex number; algebra of complex numbers – addition and subtraction                            | 12-10-2026    |             |         |
| 35          | Algebra of complex numbers – multiplication and division                                                        | 14-10-2026    |             |         |
| 36          | Additive and multiplicative inverse of a complex number                                                         | 16-10-2026    |             |         |
| 37          | Solution of a quadratic equation having discriminant $< 0$                                                      | 17-10-2026    |             |         |
| 38          | Geometrical representation of a complex number – Argand diagram                                                 | 19-10-2026    |             |         |
| 39          | Modulus and amplitude of a complex number                                                                       | 21-10-2026    |             |         |
| 40          | Polar form of a complex number                                                                                  | 23-10-2026    |             |         |
| 41          | Partial fractions – definition of polynomial fraction; proper and improper fractions                            | 24-10-2026    |             |         |
| 42          | Definition of partial fractions and resolution of fractions with non-repeated linear factors – proper fractions | 26-10-2026    |             |         |
| 43          | Resolution of fractions with non-repeated linear factors – improper fractions                                   | 28-10-2026    |             |         |
| 44          | Unit 5: Permutations, Combinations and Binomial Theorem – Definition of $n!$ and special case $0! = 1$          | 30-10-2026    |             |         |
| 45          | Simplification of factorial expressions                                                                         | 31-10-2026    |             |         |
| 46          | Permutation – meaning and formula $nPr$                                                                         | 02-11-2026    |             |         |
| 47          | Simple numerical problems on permutations                                                                       | 04-11-2026    |             |         |
| 48          | Combination – meaning and formula $nCr$                                                                         | 06-11-2026    |             |         |
| 49          | Simple numerical problems on combinations                                                                       | 07-11-2026    |             |         |
| 50          | Binomial theorem (without proof) for positive integral index – expansion                                        | 09-11-2026    |             |         |
| 51          | General form of binomial theorem for positive integral index                                                    | 11-11-2026    |             |         |
| 52          | Binomial theorem for any index – expansion without proof                                                        | 13-11-2026    |             |         |
| 53          | First binomial approximation with applications to engineering problems                                          | 14-11-2026    |             |         |
| 54          | Second binomial approximation with applications to engineering problems                                         | 16-11-2026    |             |         |
| 55          | Problems based on binomial theorem and approximations                                                           | 18-11-2026    |             |         |
| 56          | Unit-wise revision and practice – Basic Trigonometry, Functions and Limits, Differentiation                     | 20-11-2026    |             |         |

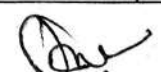
#### Assignments:

| Assignment serial | Contents of syllabus covered             | Proposed date | Actual date | Remarks |
|-------------------|------------------------------------------|---------------|-------------|---------|
| A-1               | Basic Trigonometry                       | 02-09-2026    |             |         |
| A-2               | Functions and Limits and Differentiation | 06-10-2026    |             |         |
| A-3               | Complex Number and partial Fractions     | 03-11-2026    |             |         |

#### House Test/Class Test:

| House/Class Test | Contents of syllabus covered | Proposed date                          | Actual date | Remarks |
|------------------|------------------------------|----------------------------------------|-------------|---------|
| CT-I             | 30% of the syllabus          | 2 <sup>nd</sup> week of September 2026 |             |         |
| CT-II            | Next 30% of the syllabus     | 2 <sup>nd</sup> week of October 2026   |             |         |
| House Test       | 80% of the syllabus          | 1 <sup>st</sup> Week of November 2026  |             |         |

  
(Signature of Teacher)

  
Signature of HOD

## LESSON PLAN

|                                 |                       |
|---------------------------------|-----------------------|
| Program Name                    | CIVIL ENGG            |
| Course/Subject Name             | Applied Mathematics-I |
| Course/Subject Code             | BS-101                |
| Course/Subject Coordinator Name | Dr. Kirandeep Bala    |

### Evaluation scheme

| S.No            | Subject Name          | Study scheme<br>(Hrs/Week) | Marks in evaluation scheme                                                                              |           |                     |           |
|-----------------|-----------------------|----------------------------|---------------------------------------------------------------------------------------------------------|-----------|---------------------|-----------|
|                 |                       |                            | Internal Assessment                                                                                     |           | External Assessment |           |
|                 |                       |                            | Theory                                                                                                  | Practical | Theory              | Practical |
| 1.              | Applied Mathematics-I | 4 (L: 3, T:1, P: 0)        | 50                                                                                                      | -         | 100                 | -         |
| Reference books |                       | (i)                        | Applied Mathematics - I & II for Diploma Courses, by R. D. Sharma, Dhanpat Rai Publications             |           |                     |           |
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**Course Outcomes:** After the completion of the course the student will be able to

|     |                                                                                                                                                                                                                                                                         |
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| CO2 | Explain the concept of functions and limits, evaluate standard limits, and determine limits of algebraic functions using substitution, factorization and rationalization methods.                                                                                       |
| CO3 | Apply first-principle differentiation and the rules of differentiation, including sum, product, quotient and chain rules, to differentiate algebraic, trigonometric, inverse trigonometric and logarithmic functions.                                                   |
| CO4 | Apply the concepts and algebra of complex numbers, including conjugates, inverses, quadratic equations, Argand diagrams, modulus, amplitude and polar form, and resolve proper and improper rational fractions into partial fractions with non-repeated linear factors. |
| CO5 | Apply factorials, permutations and combinations, and use the binomial theorem for positive integral and general indices, including binomial approximations, to solve numerical and engineering-related problems.                                                        |

### Teaching Plan:

| Lecture No. | Name of topic                                                                        | Proposed Date | Actual Date | Remarks |
|-------------|--------------------------------------------------------------------------------------|---------------|-------------|---------|
| 1           | Unit 1: Basic Trigonometry – Concept of angles and measurement of angles in degrees  | 12-08-2026    |             |         |
| 2           | Measurement of angles in grades and radians                                          | 13-08-2026    |             |         |
| 3           | Conversions between degrees, grades and radians                                      | 14-08-2026    |             |         |
| 4           | Radian measure formula (Arc Length Formula in radians) and simple related problems   | 19-08-2026    |             |         |
| 5           | Ratios of allied angles (without proof)                                              | 20-08-2026    |             |         |
| 6           | Trigonometric formulae – sum formulae (without proof)                                | 21-08-2026    |             |         |
| 7           | Trigonometric formulae – difference formulae (without proof)                         | 22-08-2026    |             |         |
| 8           | Applications of sum and difference formulae                                          | 27-08-2026    |             |         |
| 9           | Product formulae – transformation of product to sum and difference                   | 28-08-2026    |             |         |
| 10          | Product formulae – transformation of sum and difference to product; related problems | 29-08-2026    |             |         |
| 11          | Graphs of $\sin x$                                                                   | 02-09-2026    |             |         |
| 12          | Graphs of $\cos x$                                                                   | 03-09-2026    |             |         |
| 13          | Unit 2: Functions and Limits – Definition of function and value of a function        | 04-09-2026    |             |         |
| 14          | Even and odd functions                                                               | 05-09-2026    |             |         |
| 15          | Function of a function                                                               | 09-09-2026    |             |         |
| 16          | Limit of a function – concept and notation                                           | 10-09-2026    |             |         |
| 17          | Standard limits (with proof) – first standard limit                                  | 11-09-2026    |             |         |
| 18          | Standard limits (with proof) – remaining standard limits                             | 12-09-2026    |             |         |
| 19          | Problems based on standard limits                                                    | 16-09-2026    |             |         |
| 20          | Limit of an algebraic function by substitution method                                | 17-09-2026    |             |         |

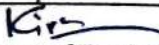
|    |                                                                                                                 |            |  |  |
|----|-----------------------------------------------------------------------------------------------------------------|------------|--|--|
| 21 | Limit of an algebraic function by factorization method                                                          | 18-09-2026 |  |  |
| 22 | Limit of an algebraic function by rationalization method                                                        | 19-09-2026 |  |  |
| 23 | Unit 3: Differentiation – Differentiation by first principle of $x(n)$                                          | 23-09-2026 |  |  |
| 24 | Differentiation by first principle of $\sin x$                                                                  | 24-09-2026 |  |  |
| 25 | Differentiation by first principle of $\cos x$                                                                  | 25-09-2026 |  |  |
| 26 | Rules of differentiation – sum rule                                                                             | 26-09-2026 |  |  |
| 27 | Rules of differentiation – product rule                                                                         | 30-09-2026 |  |  |
| 28 | Rules of differentiation – quotient rule                                                                        | 01-10-2026 |  |  |
| 29 | Chain rule – differentiation of function of a function                                                          | 03-10-2026 |  |  |
| 30 | Differentiation of trigonometric functions                                                                      | 07-10-2026 |  |  |
| 31 | Differentiation of inverse trigonometric functions                                                              | 08-10-2026 |  |  |
| 32 | Logarithmic differentiation                                                                                     | 09-10-2026 |  |  |
| 33 | Unit 4: Complex Numbers and Partial Fractions – Definition of complex numbers; real and imaginary parts         | 10-10-2026 |  |  |
| 34 | Conjugate of a complex number; algebra of complex numbers – addition and subtraction                            | 14-10-2026 |  |  |
| 35 | Algebra of complex numbers – multiplication and division                                                        | 15-10-2026 |  |  |
| 36 | Additive and multiplicative inverse of a complex number                                                         | 16-10-2026 |  |  |
| 37 | Solution of a quadratic equation having discriminant $< 0$                                                      | 17-10-2026 |  |  |
| 38 | Geometrical representation of a complex number – Argand diagram                                                 | 21-10-2026 |  |  |
| 39 | Modulus and amplitude of a complex number                                                                       | 22-10-2026 |  |  |
| 40 | Polar form of a complex number                                                                                  | 23-10-2026 |  |  |
| 41 | Partial fractions – definition of polynomial fraction; proper and improper fractions                            | 24-10-2026 |  |  |
| 42 | Definition of partial fractions and resolution of fractions with non-repeated linear factors – proper fractions | 28-10-2026 |  |  |
| 43 | Resolution of fractions with non-repeated linear factors – improper fractions                                   | 29-10-2026 |  |  |
| 44 | Unit 5: Permutations, Combinations and Binomial Theorem – Definition of $n!$ and special case $0! = 1$          | 30-10-2026 |  |  |
| 45 | Simplification of factorial expressions                                                                         | 31-10-2026 |  |  |
| 46 | Permutation – meaning and formula $nPr$                                                                         | 04-11-2026 |  |  |
| 47 | Simple numerical problems on permutations                                                                       | 05-11-2026 |  |  |
| 48 | Combination – meaning and formula $nCr$                                                                         | 06-11-2026 |  |  |
| 49 | Simple numerical problems on combinations                                                                       | 07-11-2026 |  |  |
| 50 | Binomial theorem (without proof) for positive integral index – expansion                                        | 11-11-2026 |  |  |
| 51 | General form of binomial theorem for positive integral index                                                    | 12-11-2026 |  |  |
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| 53 | First binomial approximation with applications to engineering problems                                          | 14-11-2026 |  |  |
| 54 | Second binomial approximation with applications to engineering problems                                         | 18-11-2026 |  |  |
| 55 | Problems based on binomial theorem and approximations                                                           | 19-11-2026 |  |  |
| 56 | Unit-wise revision and practice – Basic Trigonometry, Functions and Limits, Differentiation                     | 20-11-2026 |  |  |

#### Assignments:

| Assignment serial | Contents of syllabus covered             | Proposed date | Actual date | Remarks |
|-------------------|------------------------------------------|---------------|-------------|---------|
| A-1               | Basic Trigonometry                       | 01-09-2026    |             |         |
| A-2               | Functions and Limits and Differentiation | 05-10-2026    |             |         |
| A-3               | Complex Number and partial Fractions     | 05-11-2026    |             |         |

#### House Test/Class Test:

| House/Class Test | Contents of syllabus covered | Proposed date                          | Actual date | Remarks |
|------------------|------------------------------|----------------------------------------|-------------|---------|
| CT-I             | 30% of the syllabus          | 2 <sup>nd</sup> week of September 2026 |             |         |
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| House Test       | 80% of the syllabus          | 1 <sup>st</sup> Week of November 2026  |             |         |

  
(Signature of Teacher)

(Signature of HOD)

## LESSON PLAN

|                                 |                       |
|---------------------------------|-----------------------|
| Program Name                    | Computer & IOT        |
| Course/Subject Name             | Applied Mathematics-I |
| Course/Subject Code             | BS-101                |
| Course/Subject Coordinator Name | Dr. Kirandeep Bala    |

### Evaluation scheme

| S.No            | Subject Name          | Study scheme<br>(Hrs/Week) | Marks in evaluation scheme                                                                              |           |                     |           |
|-----------------|-----------------------|----------------------------|---------------------------------------------------------------------------------------------------------|-----------|---------------------|-----------|
|                 |                       |                            | Internal Assessment                                                                                     |           | External Assessment |           |
|                 |                       |                            | Theory                                                                                                  | Practical | Theory              | Practical |
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### Teaching Plan:

| Lecture No. | Name of topic                                                                        | Proposed Date | Actual Date | Remarks |
|-------------|--------------------------------------------------------------------------------------|---------------|-------------|---------|
| 1           | Unit 1: Basic Trigonometry – Concept of angles and measurement of angles in degrees  | 11-08-2026    |             |         |
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| 3           | Conversions between degrees, grades and radians                                      | 13-08-2026    |             |         |
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| 5           | Ratios of allied angles (without proof)                                              | 18-08-2026    |             |         |
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| 7           | Trigonometric formulae – difference formulae (without proof)                         | 20-08-2026    |             |         |
| 8           | Applications of sum and difference formulae                                          | 21-08-2026    |             |         |
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| 11          | Graphs of $\sin x$                                                                   | 28-08-2026    |             |         |
| 12          | Graphs of $\cos x$                                                                   | 01-09-2026    |             |         |
| 13          | Unit 2: Functions and Limits – Definition of function and value of a function        | 02-09-2026    |             |         |
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| 51 | General form of binomial theorem for positive integral index                                                    | 11-11-2026 |  |  |
| 52 | Binomial theorem for any index – expansion without proof                                                        | 12-11-2026 |  |  |
| 53 | First binomial approximation with applications to engineering problems                                          | 13-11-2026 |  |  |
| 54 | Second binomial approximation with applications to engineering problems                                         | 17-11-2026 |  |  |
| 55 | Problems based on binomial theorem and approximations                                                           | 18-11-2026 |  |  |
| 56 | Unit-wise revision and practice – Basic Trigonometry, Functions and Limits, Differentiation                     | 19-11-2026 |  |  |

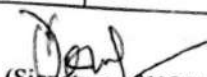
#### Assignments:

| Assignment serial | Contents of syllabus covered             | Proposed date | Actual date | Remarks |
|-------------------|------------------------------------------|---------------|-------------|---------|
| A-1               | Basic Trigonometry                       |               |             |         |
| A-2               | Functions and Limits and Differentiation | 01-09-2026    |             |         |
| A-3               | Complex Number and partial Fractions     | 05-10-2026    |             |         |
|                   |                                          | 05-11-2026    |             |         |

#### House Test/Class Test:

| House/Class Test | Contents of syllabus covered | Proposed date                          | Actual date | Remarks |
|------------------|------------------------------|----------------------------------------|-------------|---------|
| CT-I             | 30% of the syllabus          | 2 <sup>nd</sup> week of September 2026 |             |         |
| CT-II            | Next 30% of the syllabus     | 2 <sup>nd</sup> week of October 2026   |             |         |
| House Test       | 80% of the syllabus          | 1 <sup>st</sup> Week of November 2026  |             |         |

  
 (Signature of Teacher)  
 (Dr. Kirandeep)

  
 (Signature of HOD)

## LESSON PLAN

|                                 |                       |
|---------------------------------|-----------------------|
| Program Name                    | COMPUTER ENGG         |
| Course/Subject Name             | Applied Mathematics-I |
| Course/Subject Code             | BS-101                |
| Course/Subject Coordinator Name | Dr. Kirandeep Bala    |

### Evaluation scheme

| S.No                   | Subject Name          | Study scheme<br>(Hrs/Week) | Marks in evaluation scheme                                                                              |           |                     |           |
|------------------------|-----------------------|----------------------------|---------------------------------------------------------------------------------------------------------|-----------|---------------------|-----------|
|                        |                       |                            | Internal Assessment                                                                                     |           | External Assessment |           |
|                        |                       |                            | Theory                                                                                                  | Practical | Theory              | Practical |
| 1.                     | Applied Mathematics-I | 4 (L: 3, T:1, P: 0)        | 50                                                                                                      | -         | 100                 | -         |
| <b>Reference books</b> |                       | (i)                        | Applied Mathematics - I & II for Diploma Courses, by R. D. Sharma, Dhanpat Rai Publications             |           |                     |           |
|                        |                       | (ii)                       | Mathematics for Class XI & XII, NCERT Publication, New Delhi.                                           |           |                     |           |
|                        |                       | (iii)                      | Higher Engineering Mathematics, by B.S. Grewal, Khanna Publishers, New Delhi, Latest Edition.           |           |                     |           |
|                        |                       | (iv)                       | Advanced Engineering Mathematics, by Reena Garg & Chandrika Prasad, Khanna Publishing House, New Delhi. |           |                     |           |

**Course Outcomes:** After the completion of the course the student will be able to

|     |                                                                                                                                                                                                                                                                         |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1 | Explain and apply the concepts of angles, radian measure, allied angles, trigonometric identities, product formulae and graphs of sine and cosine functions to solve mathematical and engineering-related problems.                                                     |
| CO2 | Explain the concept of functions and limits, evaluate standard limits, and determine limits of algebraic functions using substitution, factorization and rationalization methods.                                                                                       |
| CO3 | Apply first-principle differentiation and the rules of differentiation, including sum, product, quotient and chain rules, to differentiate algebraic, trigonometric, inverse trigonometric and logarithmic functions.                                                   |
| CO4 | Apply the concepts and algebra of complex numbers, including conjugates, inverses, quadratic equations, Argand diagrams, modulus, amplitude and polar form, and resolve proper and improper rational fractions into partial fractions with non-repeated linear factors. |
| CO5 | Apply factorials, permutations and combinations, and use the binomial theorem for positive integral and general indices, including binomial approximations, to solve numerical and engineering-related problems.                                                        |

### Teaching Plan:

| Lecture No. | Name of topic                                                                        | Proposed Date | Actual Date | Remarks |
|-------------|--------------------------------------------------------------------------------------|---------------|-------------|---------|
| 1           | Unit 1: Basic Trigonometry – Concept of angles and measurement of angles in degrees  | 10-08-2026    |             |         |
| 2           | Measurement of angles in grades and radians                                          | 11-08-2026    |             |         |
| 3           | Conversions between degrees, grades and radians                                      | 12-08-2026    |             |         |
| 4           | Radian measure formula (Arc Length Formula in radians) and simple related problems   | 17-08-2026    |             |         |
| 5           | Ratios of allied angles (without proof)                                              | 18-08-2026    |             |         |
| 6           | Trigonometric formulae – sum formulae (without proof)                                | 19-08-2026    |             |         |
| 7           | Trigonometric formulae – difference formulae (without proof)                         | 22-08-2026    |             |         |
| 8           | Applications of sum and difference formulae                                          | 24-08-2026    |             |         |
| 9           | Product formulae – transformation of product to sum and difference                   | 25-08-2026    |             |         |
| 10          | Product formulae – transformation of sum and difference to product; related problems | 26-08-2026    |             |         |
| 11          | Graphs of $\sin x$                                                                   | 29-08-2026    |             |         |
| 12          | Graphs of $\cos x$                                                                   | 31-08-2026    |             |         |
| 13          | Unit 2: Functions and Limits – Definition of function and value of a function        | 01-09-2026    |             |         |
| 14          | Even and odd functions                                                               | 02-09-2026    |             |         |
| 15          | Function of a function                                                               | 05-09-2026    |             |         |
| 16          | Limit of a function – concept and notation                                           | 07-09-2026    |             |         |
| 17          | Standard limits (with proof) – first standard limit                                  | 08-09-2026    |             |         |
| 18          | Standard limits (with proof) – remaining standard limits                             | 09-09-2026    |             |         |
| 19          | Problems based on standard limits                                                    | 12-09-2026    |             |         |
| 20          | Limit of an algebraic function by substitution method                                | 14-09-2026    |             |         |

|    |                                                                                                                 |            |  |  |
|----|-----------------------------------------------------------------------------------------------------------------|------------|--|--|
| 21 | Limit of an algebraic function by factorization method                                                          | 15-09-2026 |  |  |
| 22 | Limit of an algebraic function by rationalization method                                                        | 16-09-2026 |  |  |
| 23 | Unit 3: Differentiation – Differentiation by first principle of $x(n)$                                          | 19-09-2026 |  |  |
| 24 | Differentiation by first principle of $\sin x$                                                                  | 21-09-2026 |  |  |
| 25 | Differentiation by first principle of $\cos x$                                                                  | 22-09-2026 |  |  |
| 26 | Rules of differentiation – sum rule                                                                             | 23-09-2026 |  |  |
| 27 | Rules of differentiation – product rule                                                                         | 26-09-2026 |  |  |
| 28 | Rules of differentiation – quotient rule                                                                        | 28-09-2026 |  |  |
| 29 | Chain rule – differentiation of function of a function                                                          | 29-09-2026 |  |  |
| 30 | Differentiation of trigonometric functions                                                                      | 30-09-2026 |  |  |
| 31 | Differentiation of inverse trigonometric functions                                                              | 03-10-2026 |  |  |
| 32 | Logarithmic differentiation                                                                                     | 05-10-2026 |  |  |
| 33 | Unit 4: Complex Numbers and Partial Fractions – Definition of complex numbers; real and imaginary parts         | 06-10-2026 |  |  |
| 34 | Conjugate of a complex number; algebra of complex numbers – addition and subtraction                            | 07-10-2026 |  |  |
| 35 | Algebra of complex numbers – multiplication and division                                                        | 10-10-2026 |  |  |
| 36 | Additive and multiplicative inverse of a complex number                                                         | 12-10-2026 |  |  |
| 37 | Solution of a quadratic equation having discriminant $< 0$                                                      | 13-10-2026 |  |  |
| 38 | Geometrical representation of a complex number – Argand diagram                                                 | 14-10-2026 |  |  |
| 39 | Modulus and amplitude of a complex number                                                                       | 17-10-2026 |  |  |
| 40 | Polar form of a complex number                                                                                  | 19-10-2026 |  |  |
| 41 | Partial fractions – definition of polynomial fraction; proper and improper fractions                            | 21-10-2026 |  |  |
| 42 | Definition of partial fractions and resolution of fractions with non-repeated linear factors – proper fractions | 24-10-2026 |  |  |
| 43 | Resolution of fractions with non-repeated linear factors – improper fractions                                   | 27-10-2026 |  |  |
| 44 | Unit 5: Permutations, Combinations and Binomial Theorem – Definition of $n!$ and special case $0! = 1$          | 28-10-2026 |  |  |
| 45 | Simplification of factorial expressions                                                                         | 31-10-2026 |  |  |
| 46 | Permutation – meaning and formula $nPr$                                                                         | 02-11-2026 |  |  |
| 47 | Simple numerical problems on permutations                                                                       | 03-11-2026 |  |  |
| 48 | Combination – meaning and formula $nCr$                                                                         | 04-11-2026 |  |  |
| 49 | Simple numerical problems on combinations                                                                       | 07-11-2026 |  |  |
| 50 | Binomial theorem (without proof) for positive integral index – expansion                                        | 09-11-2026 |  |  |
| 51 | General form of binomial theorem for positive integral index                                                    | 10-11-2026 |  |  |
| 52 | Binomial theorem for any index – expansion without proof                                                        | 11-11-2026 |  |  |
| 53 | First binomial approximation with applications to engineering problems                                          | 14-11-2026 |  |  |
| 54 | Second binomial approximation with applications to engineering problems                                         | 16-11-2026 |  |  |
| 55 | Problems based on binomial theorem and approximations                                                           | 17-11-2026 |  |  |
| 56 | Unit-wise revision and practice – Basic Trigonometry, Functions and Limits, Differentiation                     | 18-11-2026 |  |  |

#### Assignments:

| Assignment serial | Contents of syllabus covered             | Proposed date | Actual date | Remarks |
|-------------------|------------------------------------------|---------------|-------------|---------|
| A-1               | Basic Trigonometry                       | 01-09-2026    |             |         |
| A-2               | Functions and Limits and Differentiation | 05-10-2026    |             |         |
| A-3               | Complex Number and partial Fractions     | 05-11-2026    |             |         |

#### House Test/Class Test:

| House/Class Test | Contents of syllabus covered | Proposed date                          | Actual date | Remarks |
|------------------|------------------------------|----------------------------------------|-------------|---------|
| CT-I             | 30% of the syllabus          | 2 <sup>nd</sup> week of September 2026 |             |         |
| CT-II            | Next 30% of the syllabus     | 2 <sup>nd</sup> week of October 2026   |             |         |
| House Test       | 80% of the syllabus          | 1 <sup>st</sup> Week of November 2026  |             |         |

(Signature of Teacher)

(Signature of HOD)

## LESSON PLAN

|                                 |                       |
|---------------------------------|-----------------------|
| Program Name                    | MECHANICAL ENGG       |
| Course/Subject Name             | Applied Mathematics-I |
| Course/Subject Code             | BS-101                |
| Course/Subject Coordinator Name | Dr. Kirandeep Bala    |

### Evaluation scheme

| S.No            | Subject Name          | Study scheme<br>(Hrs/Week) | Marks in evaluation scheme                                                                              |           |                     |           |
|-----------------|-----------------------|----------------------------|---------------------------------------------------------------------------------------------------------|-----------|---------------------|-----------|
|                 |                       |                            | Internal Assessment                                                                                     |           | External Assessment |           |
|                 |                       |                            | Theory                                                                                                  | Practical | Theory              | Practical |
| 1.              | Applied Mathematics-I | 4 (L: 3, T:1, P: 0)        | 50                                                                                                      | -         | 100                 | -         |
| Reference books |                       | (i)                        | Applied Mathematics - I & II for Diploma Courses, by R. D. Sharma, Dhanpat Rai Publications             |           |                     |           |
|                 |                       | (ii)                       | Mathematics for Class XI & XII, NCERT Publication, New Delhi.                                           |           |                     |           |
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|                 |                       | (iv)                       | Advanced Engineering Mathematics, by Reena Garg & Chandrika Prasad, Khanna Publishing House, New Delhi. |           |                     |           |

**Course Outcomes:** After the completion of the course the student will be able to

|     |                                                                                                                                                                                                                                                                         |
|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CO1 | Explain and apply the concepts of angles, radian measure, allied angles, trigonometric identities, product formulae and graphs of sine and cosine functions to solve mathematical and engineering-related problems.                                                     |
| CO2 | Explain the concept of functions and limits, evaluate standard limits, and determine limits of algebraic functions using substitution, factorization and rationalization methods.                                                                                       |
| CO3 | Apply first-principle differentiation and the rules of differentiation, including sum, product, quotient and chain rules, to differentiate algebraic, trigonometric, inverse trigonometric and logarithmic functions.                                                   |
| CO4 | Apply the concepts and algebra of complex numbers, including conjugates, inverses, quadratic equations, Argand diagrams, modulus, amplitude and polar form, and resolve proper and improper rational fractions into partial fractions with non-repeated linear factors. |
| CO5 | Apply factorials, permutations and combinations, and use the binomial theorem for positive integral and general indices, including binomial approximations, to solve numerical and engineering-related problems.                                                        |

### Teaching Plan:

| Lecture No. | Name of topic                                                                        | Proposed Date | Actual Date | Remarks |
|-------------|--------------------------------------------------------------------------------------|---------------|-------------|---------|
| 1           | Unit 1: Basic Trigonometry – Concept of angles and measurement of angles in degrees  | 10-08-2026    |             |         |
| 2           | Measurement of angles in grades and radians                                          | 11-08-2026    |             |         |
| 3           | Conversions between degrees, grades and radians                                      | 13-08-2026    |             |         |
| 4           | Radian measure formula (Arc Length Formula in radians) and simple related problems   | 14-08-2026    |             |         |
| 5           | Ratios of allied angles (without proof)                                              | 17-08-2026    |             |         |
| 6           | Trigonometric formulae – sum formulae (without proof)                                | 18-08-2026    |             |         |
| 7           | Trigonometric formulae – difference formulae (without proof)                         | 20-08-2026    |             |         |
| 8           | Applications of sum and difference formulae                                          | 21-08-2026    |             |         |
| 9           | Product formulae – transformation of product to sum and difference                   | 24-08-2026    |             |         |
| 10          | Product formulae – transformation of sum and difference to product; related problems | 25-08-2026    |             |         |
| 11          | Graphs of $\sin x$                                                                   | 27-08-2026    |             |         |
| 12          | Graphs of $\cos x$                                                                   | 28-08-2026    |             |         |
| 13          | Unit 2: Functions and Limits – Definition of function and value of a function        | 31-08-2026    |             |         |
| 14          | Even and odd functions                                                               | 01-09-2026    |             |         |
| 15          | Function of a function                                                               | 03-09-2026    |             |         |
| 16          | Limit of a function – concept and notation                                           | 07-09-2026    |             |         |
| 17          | Standard limits (with proof) – first standard limit                                  | 08-09-2026    |             |         |
| 18          | Standard limits (with proof) – remaining standard limits                             | 10-09-2026    |             |         |
| 19          | Problems based on standard limits                                                    | 11-09-2026    |             |         |
| 20          | Limit of an algebraic function by substitution method                                | 14-09-2026    |             |         |

|    |                                                                                                                 |            |  |  |
|----|-----------------------------------------------------------------------------------------------------------------|------------|--|--|
| 21 | Limit of an algebraic function by factorization method                                                          | 15-09-2026 |  |  |
| 22 | Limit of an algebraic function by rationalization method                                                        | 17-09-2026 |  |  |
| 23 | Unit 3: Differentiation – Differentiation by first principle of $x(n)$                                          | 18-09-2026 |  |  |
| 24 | Differentiation by first principle of $\sin x$                                                                  | 21-09-2026 |  |  |
| 25 | Differentiation by first principle of $\cos x$                                                                  | 22-09-2026 |  |  |
| 26 | Rules of differentiation – sum rule                                                                             | 24-09-2026 |  |  |
| 27 | Rules of differentiation – product rule                                                                         | 25-09-2026 |  |  |
| 28 | Rules of differentiation – quotient rule                                                                        | 28-09-2026 |  |  |
| 29 | Chain rule – differentiation of function of a function                                                          | 29-09-2026 |  |  |
| 30 | Differentiation of trigonometric functions                                                                      | 01-10-2026 |  |  |
| 31 | Differentiation of inverse trigonometric functions                                                              | 05-10-2026 |  |  |
| 32 | Logarithmic differentiation                                                                                     | 06-10-2026 |  |  |
| 33 | Unit 4: Complex Numbers and Partial Fractions – Definition of complex numbers; real and imaginary parts         | 08-10-2026 |  |  |
| 34 | Conjugate of a complex number; algebra of complex numbers – addition and subtraction                            | 09-10-2026 |  |  |
| 35 | Algebra of complex numbers – multiplication and division                                                        | 12-10-2026 |  |  |
| 36 | Additive and multiplicative inverse of a complex number                                                         | 13-10-2026 |  |  |
| 37 | Solution of a quadratic equation having discriminant $< 0$                                                      | 15-10-2026 |  |  |
| 38 | Geometrical representation of a complex number – Argand diagram                                                 | 16-10-2026 |  |  |
| 39 | Modulus and amplitude of a complex number                                                                       | 22-10-2026 |  |  |
| 40 | Polar form of a complex number                                                                                  | 23-10-2026 |  |  |
| 41 | Partial fractions – definition of polynomial fraction; proper and improper fractions                            | 27-10-2026 |  |  |
| 42 | Definition of partial fractions and resolution of fractions with non-repeated linear factors – proper fractions | 29-10-2026 |  |  |
| 43 | Resolution of fractions with non-repeated linear factors – improper fractions                                   | 30-10-2026 |  |  |
| 44 | Unit 5: Permutations, Combinations and Binomial Theorem – Definition of $n!$ and special case $0! = 1$          | 02-11-2026 |  |  |
| 45 | Simplification of factorial expressions                                                                         | 03-11-2026 |  |  |
| 46 | Permutation – meaning and formula $nPr$                                                                         | 05-11-2026 |  |  |
| 47 | Simple numerical problems on permutations                                                                       | 06-11-2026 |  |  |
| 48 | Combination – meaning and formula $nCr$                                                                         | 09-11-2026 |  |  |
| 49 | Simple numerical problems on combinations                                                                       | 10-11-2026 |  |  |
| 50 | Binomial theorem (without proof) for positive integral index – expansion                                        | 12-11-2026 |  |  |
| 51 | General form of binomial theorem for positive integral index                                                    | 13-11-2026 |  |  |
| 52 | Binomial theorem for any index – expansion without proof                                                        | 16-11-2026 |  |  |
| 53 | First binomial approximation with applications to engineering problems                                          | 17-11-2026 |  |  |
| 54 | Second binomial approximation with applications to engineering problems                                         | 19-11-2026 |  |  |
| 55 | Problems based on binomial theorem and approximations                                                           | 20-11-2026 |  |  |
| 56 | Unit-wise revision and practice – Basic Trigonometry, Functions and Limits, Differentiation                     | 23-11-2026 |  |  |

### Assignments:

| Assignment serial | Contents of syllabus covered             | Proposed date | Actual date | Remarks |
|-------------------|------------------------------------------|---------------|-------------|---------|
| A-1               | Basic Trigonometry                       | 02-09-2026    |             |         |
| A-2               | Functions and Limits and Differentiation | 06-10-2026    |             |         |
| A-3               | Complex Number and partial Fractions     | 03-11-2026    |             |         |

### House Test/Class Test:

| House/Class Test | Contents of syllabus covered | Proposed date                          | Actual date | Remarks |
|------------------|------------------------------|----------------------------------------|-------------|---------|
| CT-I             | 30% of the syllabus          | 2 <sup>nd</sup> week of September 2026 |             |         |
| CT-II            | Next 30% of the syllabus     | 2 <sup>nd</sup> week of October 2026   |             |         |
| House Test       | 80% of the syllabus          | 1 <sup>st</sup> Week of November 2026  |             |         |

(Signature of Teacher)

(Signature of HOD)