

**School of Mechanical Engineering**

**Course Plan – BMEE201L Engineering Mechanics**

**Winter 2021-22**

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| **MODULE** | **Syllabus** | **NO OF HOURS** | |
| **TOPIC** | **THEORY** | **TUTORIAL** |
| 1 | Statics of Particles | 3 | 2 |
| 2 | Statics of Rigid Bodies | 5 | 2 |
| 3 | Analysis of Structures | 3 | 2 |
| 4 | Friction | 3 | 2 |
| 5 | Properties of Surfaces and Solids | 5 | 2 |
| 6 | Dynamics of Particles | 5 | 3 |
| 7 | Dynamics of Rigid Bodies | 6 | 2 |
|  | Total | 30 | 15 |

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| **Sl.No** | **Date** | **Module** | **Periods** | **Topics** | **Theory/Tutorial** |
| 1 | 15-02-2022 | 1 | 1 | Course introduction and fundamental concepts and principles |  |
| 2 | 16-02-2022 | 1 | 1 | Resolution of a force - Resultant of forces in a plane |  |
| 3 | 18-02-2022 | 1 | 1 | Equilibrium of a particle in a plane | Tutorial |
| 4 | 22-02-2022 | 1 | 1 | Addition of concurrent forces in space |  |
| 5 | 23-02-2022 | 1 | 1 | Equilibrium of a particle in space | Tutorial |
| 6 | 25-02-2022 | 2 | 1 | Equivalent systems of forces- Principle of Transmissibility - Moment of a force about a point and an axis | **(ASSIGNMENT 1)** |
| 7 | 01-03-2022 | 2 | 1 | Couples and force-couple systems |  |
| 8 | 02-03-2022 | 2 | 1 | Types of beams, supports and reactions (2D & 3D) |  |
| 9 | 04-03-2022 | 2 | 1 | Equilibrium of rigid bodies in two dimensions | Tutorial |
| 10 | 08-03-2022 | 2 | 1 | Equilibrium of rigid bodies in three dimensions |  |
| 11 | 09-03-2022 | 2 | 1 | Principle of virtual work – System of connected rigid bodies |  |
| 12 | 11-03-2022 | 2 | 1 | System of connected rigid bodies | Tutorial |
| 13 | 15-03-2022 | 3 | 1 | Analysis of plane trusses |  |
| 14 | 16-03-2022 | 3 | 1 | Method of joints |  |
| **CAT 1 – 19th to 26th March 2022** | | | | | |
| 15 | 29-03-2022 | 3 | 1 | Method of joints - Problems | Tutorial |
| 16 | 30-03-2022 | 3 | 1 | Method of sections | Tutorial |
| 17 | 01-04-2022 | 3 | 1 | Analysis of Frames |  |
| 18 | 05-04-2022 | 4 | 1 | The laws of dry friction – Coefficients of Friction- Angles of Friction | **(ASSIGNMENT 2)** |
| 19 | 06-04-2022 | 4 | 1 | Types of Friction Problems – Block friction |  |
| 20 | 08-04-2022 | 4 | 1 | Wedge friction | Tutorial |
| 21 | 12-04-2022 | 4 | 1 | Ladder friction | Tutorial |
| 22 | 13-04-2022 | 4 | 1 | Belt friction |  |
| 23 | 15-04-2022 | 5 | 1 | First moments of areas and lines- Centroids of composite areas and lines- Theorems of Pappus-Guldinus |  |
| 24 | 19-04-2022 | 5 | 1 | Second moment of area- Parallel axis theorem |  |
| 25 | 20-04-2022 | 5 | 1 | Rectangular and Polar Moments of inertia of composite areas- Radius of Gyration |  |
| 26 | 22-04-2022 | 5 | 1 | Rectangular and Polar Moments of inertia of composite areas- Radius of Gyration - Problems | Tutorial |
| 27 | 26-04-2022 | 5 | 1 | Product of Inertia- Principal Axes and Principal Moments of Inertia |  |
| 28 | 27-04-2022 | 5 | 1 | Mass moments of inertia of thin plates |  |
| 29 | 29-04-2022 | 5 | 1 | Mass moments of inertia of thin plates - Problems | Tutorial |
| **CAT 2 – 30th April to 08th May 2022** | | | | | |
| 30 | 10-05-2022 | 6 | 1 | Velocity and Acceleration – Rectilinear motion – Curvilinear motion |  |
| 31 | 11-05-2022 | 6 | 1 | Tangential and Normal components – Radial and Transverse components |  |
| 32 | 13-05-2022 | 6 | 1 | Kinematics of particles - Problems | Tutorial |
| 33 | 17-05-2022 | 6 | 1 | Newton’s Second Law- Energy and Momentum Methods |  |
| 34 | 18-05-2022 | 6 | 1 | Newton’s Second Law- Energy and Momentum Methods - Problems | Tutorial |
| 35 | 20-05-2022 | 6 | 1 | Principle of Work and Energy - Principle of Impulse and Momentum |  |
| 36 | 24-05-2022 | 6 | 1 | Principle of Work and Energy - Principle of Impulse and Momentum - Problems | Tutorial |
| 37 | 25-05-2022 | 6 | 1 | Direct Central Impact |  |
| 38 | 27-05-2022 | 7 | 1 | Translation and fixed-axis rotation- General plane motion: velocity- Instantaneous centre of rotation- General plane motion: acceleration |  |
| 39 | 31-05-2022 | 7 | 1 | Problems | Tutorial |
| 40 | 01-06-2022 | 7 | 1 | Equations of motion - Angular momentum |  |
| 41 | 03-06-2022 | 7 | 1 | Plane motion of a rigid body |  |
| 42 | 07-06-2022 | 7 | 1 | Principle of work and energy for rigid bodies |  |
| 43 | 08-06-2022 | 7 | 1 | Principle of impulse and momentum for rigid bodies | **(ASSIGNMENT 3)** |
| 44 | 10-06-2022 | 7 | 1 | Problems | Tutorial |

**Assignment 1** – Modules 1 & 2

**Assignment 2** – Modules 3, 4 & 5

**Assignment 3** – Modules 6 & 7 (Quiz)