

ENGINEERING MECHANICS

Time Allowed : 3:00 Hours

Maximum Marks : 60

- Notes: (i) Attempt all the questions.
- (ii) Students are advised to specially check the numerical data of question paper in both versions. If there is any difference in Hindi translation of any question, the students should answer the question according to the English version.
- (iii) Use of Pager and Mobile phone by the students is not allowed.

- Q.1. Answer **any two** parts of the following : [2×5=10]
- Explain the principle of transmissibility of forces with examples.
 - Explain the law of triangle of forces and its applications.
 - Two forces of 6 N and 8 N act at a point making an angle of 60° between them. Find the resultant force and its direction.
- Q.2. Answer **any two** parts of the following : [2×5=10]
- State and explain Lami's theorem. Mention its engineering applications.
 - Define a beam and classify beams based on supports.
 - Find reactions of a simply supported beam with point load only.
- Q.3. Answer **any two** parts of the following : [2×5=10]
- Explain angle of repose and its significance.
 - A block of weight 500 N rests on a rough inclined plane of 30° . Coefficient of friction is 0.25. Check whether the block will slide.
 - Discuss equilibrium of a body on a rough horizontal surface with force inclined to the plane.
- Q.4. Answer **any two** parts of the following : [2×5=10]
- Define centroid and centre of gravity. Differentiate between them.
 - State and explain the perpendicular axis theorem.
 - Determine the moment of inertia of T-section.
- Q.5. Answer **any two** parts of the following : [2×5=10]
- State and explain the law of machines.
 - Describe the construction and working of a wheel and axle.
 - Discuss worm and worm wheel with applications.
- Q.6. Answer **any five** parts of the following : [5×2=10]
- Polygon law of forces is applicable only for concurrent force systems. [True/False]
 - Algebraic sum of all forces and moment acting on body in equilibrium must be zero. [True/False]
 - The angle of repose is always equal to the angle of friction. [True/False]
 - Frictional force always acts in the direction of motion of the body. [True/False]
 - Moment of inertia of an area depends on the mass of body. [True/False]
 - A reversible machine can work both as a lifting and lowering device. [True/False]
 - The centroid of a symmetrical body lies on its axis of symmetry. [True/False]