# IIND SEM ./COMMON / 2022(S) 

## Th4(a) - Engineering Mechanics

Answer any five Questions including Q No.1\& 2
Figures in the right hand margin indicates marks

1. Answer All questions
a. State the Law of Conservation of Linear momentum.
b. What is fundamental unit and derived units with examples?
c. What is coefficient of friction?
d. Write down the expression for Velocity Ratio of a Simple wheel and Axle.
e. What is Coplanar Concurrent Forces?
f. State Newton's $1^{\text {st }}$ law of motion.
g. What is Self Locking machine?
h. What is the distance of centroid of a semi circular area from the base?
i. Define Force and its unit in S.I system.
j. Define Couple and its unit.
2. Answer Any Six Questions
a. Derive the relation between Mechanical Advantage, Velocity Ratio and Efficiency of a Lifting machine.
b. In a lifting machine, an effort of 15 N can lift a load of 300 N and an effort of 20 N can lift a load of 500 N . Find the law of machine. Also find the effort required to lift a load of 880 N .
c. What is Gear Train .Derive its velocity ratio of a Simple Gear Train.
d. State and Proof the Polygon Law of Forces.
e. Find the angle between two equal forces $p$, when their resultant is equal to (i) $p$ and (ii) p/2
f. State and prove Lami's theorem.
g The following forces act at a point
(i) 20 N inclined at $30^{\circ}$ towards North to East.
(ii) 25 N towards North
(iii) 30 N towards North west, and
(iv) 35 N inclined at $40^{\circ}$ towards south of west.

Find the magnitude and direction of the resultant force.

4 Define Centroid.
An I- section has the following dimensions in mm units.
Bottom flange $=300 \times 100$
Top flange= $150 \times 50$
Web= $300 \times 50$
Determine mathematically the position of centre of gravity of the section.
5 Define Angle of repose.
A body of weight 500N is pulled up an inclined plane, by a force of 350 N . The inclination of the plane is $30^{\circ}$ to the horizontal and the force is applied parallel to the plane. Determine the co-efficient of friction.

6 A body of weight 70KN is suspended by two strings whose lengths are 6 cm and 8 cm from two points in the same horizontal level. The horizontal distance between the two points is 10 cm .
Determine the tensions of the strings.

Define Coefficient of Restitution. What are various types of Impacts? Discuss any one of them.

