MID TERM EXAMINATION OCT. – 2023
ENGINEERING MECHANICS
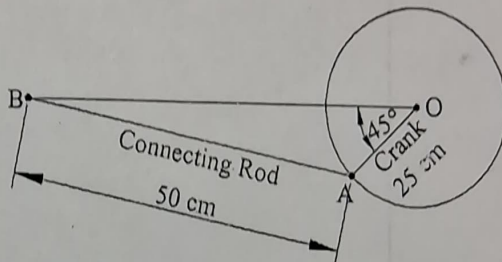
Time: 01 Hr.

Maximum Marks: 30
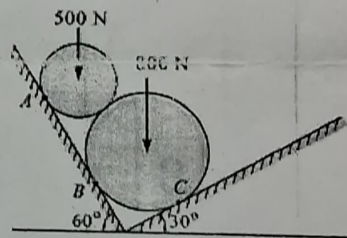
Note: Scientific calculators are allowed as per norm.

SECTION-A (Attempt any two questions, Each of 05 Marks)

1. Briefly explain the followings:
i. Principle of transmissibility.
ii. Varignon's Theorem.
iii. Angle of repose and angle of friction
iv. State of Equilibrium.
v. Force system and force characteristics.

2. Following figure shows a particular position of the connecting rod BA and crank AO. At this position, the connecting rod of the engine exerts a force 2500N on the crank pin at A. Resolve this force into horizontal and vertical components at A. Also, resolve the given force at A along AO and along a Direction perpendicular to AO.

3. A machine component of length 2.5 metres and height 1 metre is carried upstairs by two men, who hold it by the front and back edges of its lower face. If the machine component is inclined at 30° to the horizontal and weighs 100 N, find how much of the weight each man supports?
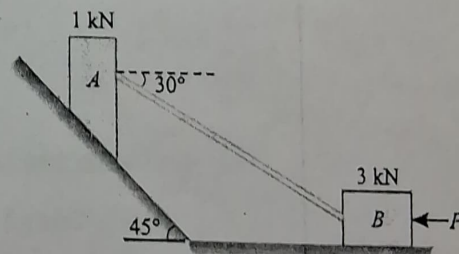
SECTION-B (Attempt any One question, 10 Marks)

4. Two smooth cylinders with diameters 250mm & 400mm respectively are kept in a groove with slanting surfaces making angles 60° & 30° as shown in fig. Determine the reactions at contact points A, B and C.

5. A block (A) weighing 1 kN rests on a rough inclined plane whose inclination to the horizontal is 45°. This block is connected to another block (B) weighing 3 kN rests on a rough horizontal plane by a weightless rigid bar inclined at an angle of 30° to the horizontal as shown in Fig. Find horizontal force (P) required to be applied to the block (B) just to move the block (A) in upward direction. Assume angle of limiting friction as 15° at all surfaces where there is sliding.

SECTION-C (Compulsory, 10 Marks)

6. A system in the equilibrium shown as figure below, having a smooth pulley weighing 50 N and radius 2 m. Pulley is mounted at an end of horizontal rod ECF which is fixed at end E. Horizontal rod is hinge supported by another L shaped rod ABCD at C. Rod ABCD is fixed at end A and other end D is connected with a string which is passing through pulley horizontally. A weight of 100N is attached with the other end of the string and a load of 10 N is applied on the rod ABCD. Determine the magnitude and direction of reaction at hinge C.