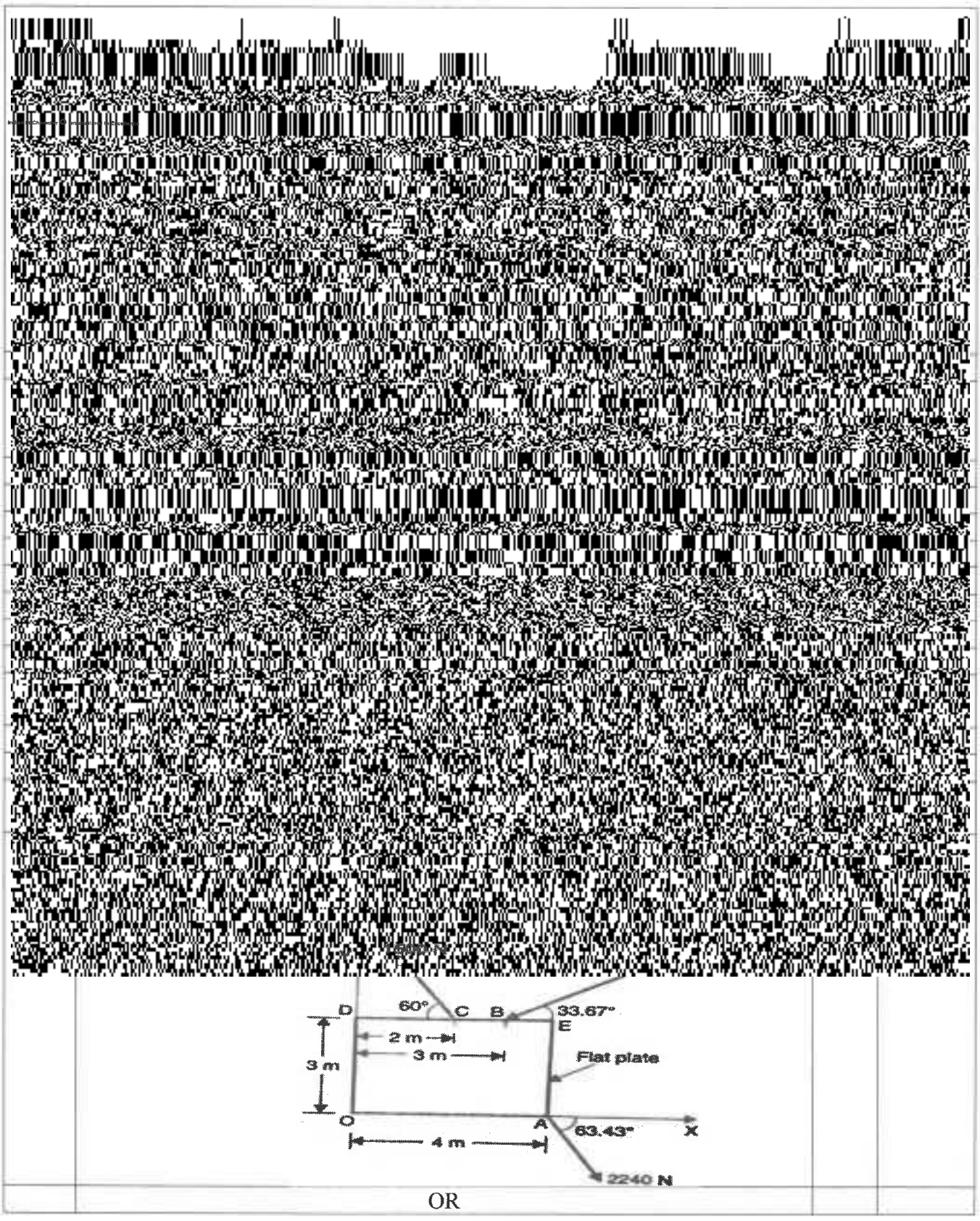
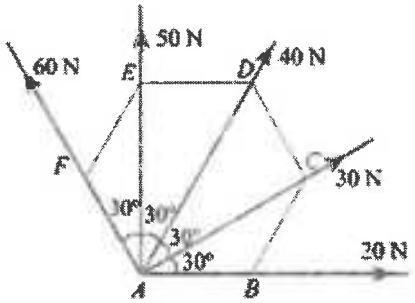
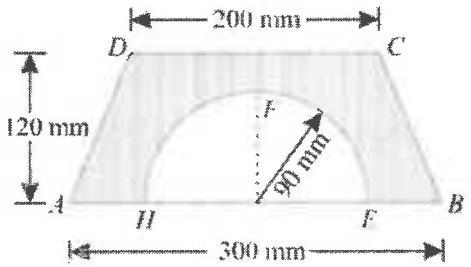



OR

| | | | |
|---|---|---|---|
| 3 | The forces 20 N, 30 N, 40 N, 50 N and 60 N are acting at one of the angular points of a regular hexagon, towards the other five angular points, taken in order. Calculate the magnitude and direction of the resultant force. [10M]<br>  | 1 | 3 |
| 4 | Find the position of the centre of gravity of the figure. [10M]<br>  | 2 | 1 |
| | OR | | |
| 5 | A uniform ladder of weight 800N and of length 7 m rests on a horizontal ground and leans against a smooth vertical wall. The angle made by the ladder with the horizontal is 60°. When a man of weight 600N stands on the ladder at a distance 4m from the top of the ladder, the ladder is at the point of sliding. Determine the coefficient of friction between the ladder and the floor. [10M] | 2 | 5 |
| 6 | a) State and prove perpendicular axis theorem for area moment of inertia. [5M]<br>b) Derive an expression to determine the moment of inertia of a semi circle about its diametric base. [5M] | 3 | 2 |
| | OR | | |
| 7 | Derive about the expression for finding mass moment of inertia of a cylinder of radius R and height h about its base. [10M] | 3 | 4 |
| 8 | a) Two bodies A and B are connected by a thread and move along a rough horizontal plane ($\mu = 0.3$) under the action of force of 400 N applied to the body B. Find the acceleration of the two bodies and tension in the thread using D'Alembert's principle. [7M]<br>b) State work - energy principle. [3M] | 4 | 1 |
| | OR | | |

| | | | |
|---|---|---|---|
| 9 | A block of 2 kg mass rests on a rough horizontal surface, whose coefficient of kinetic friction is 0.2. It is acted by a horizontal force of 10 N for 5 sec and then it is removed. Determine how far it would travel before coming to rest, assuming the frictional resistance to be uniform. Also, determine the total distance travelled from rest. [10M] | 4 | 5 |
| 10 | a) A particle has simple harmonic motion. Its maximum velocity was 6m/s and the maximum acceleration was found to be $12m/s^2$. Determine the angular velocity and amplitude. Also determine its velocity and acceleration, when displacement is half of the amplitude. [6M]<br>b) With a sketch explain the difference between simple pendulum and compound pendulum. [4M] | 5 | 5 |
| | OR | | |
| 11 | a) A body is moving with simple harmonic motion and has velocities of 8m/s and 3m/s at a distance of 1.5m and 2.5m respectively from the centre. Find the amplitude and time period of the body. [10M] | 5 | 1 |