

Assignment: 2 Turning moment diagrams and flywheel

1.	Draw and explain Turning Moment Diagram for a Four Stroke Cycle Internal Combustion Engine.
2.	Determine Maximum Fluctuation of Energy and Coefficient of Fluctuation of Energy.
3.	What is Flywheel? Explain Coefficient of Fluctuation of Speed.
4.	Explain Energy Stored in Flywheel
5.	Explain Flywheel in Punching Press.

Examples

1.	A horizontal cross compound steam engine develops 300 kW at 90 r.p.m. The coefficient of fluctuation of energy as found from the turning moment diagram is to be 0.1 and the fluctuation of speed is to be kept within $\pm 0.5\%$ of the mean speed. Find the weight of the flywheel required, if the radius of gyration is 2 metres.
2.	The turning moment diagram for a multicylinder engine has been drawn to a scale 1 mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line, taken in order from one end, are as follows : + 52, - 124, + 92, - 140, + 85, - 72 and + 107 mm ² , when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed $\pm 1.5\%$ of the mean, find the necessary mass of the flywheel of radius 0.5 m.
3.	An Otto cycle engine develops 50 kW at 150 r.p.m. with 75 explosions per minute. The change of speed from the commencement to the end of power stroke must not exceed 0.5% of mean on either side. Find the mean diameter of the flywheel and a suitable rim cross section having width four times the depth so that the hoop stress does not exceed 4 MPa. Assume that the flywheel stores 16/15 times the energy stored by the rim and the work done during power stroke is 1.40 times the work done during the cycle. Density of rim material is 7200 kg/m ³ .
4.	A punching press is driven by a constant torque electric motor. The press is provided with a flywheel that rotates at maximum speed of 225 r.p.m. The radius of gyration of the flywheel is 0.5 m. The press punches 720 holes per hour; each punching operation takes 2 second and requires 15 kN-m of energy. Find the power of the motor and the minimum mass of the flywheel if speed of the same is not to fall below 200 r. p. m.