ASSIGNMENT SHEET

ON

THEORY OF MACHINE

B.TECH
(MECHANICAL ENGINEERING)

Department of Mechanical Engineering

UNIVERSAL INSTITUTE OF ENGINEERING TECHNOLOGY
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ASSIGNMENT NO.1	
Sr. No.	Questions
1	Derive the relation for the magnitude of gyroscopic couple.
2	Discuss the gyroscopic effect on sea vessels
3	Explain the gyroscopic effects on the motion of an air craft while taking a turn
4	Explain the gyroscopic effect on a ship during pitching
5	How are free body diagrams helpful in finding the various forces acting on different members of the mechanism?
6	A vertical petrol engine 150 mm diameter and 200 mm stroke has a connecting rod 350 mm long. The mass of the piston is 1.6 kg and the engine speed is 1800 rpm. On the expansion stroke with crank angle 30˚ from top dead center, the gas pressure is 750 kN/m2 . Determine the net thrust on the piston
7	For the static equilibrium of a quick return mechanism of crank and slotted lever, determine the required input torque for a force of 5000N acting from left to right on the slider. The dimensions of various links are crank AB=120mm, fixed link AC =175 mm, connecting link DE=250mm and slotted link CD= 300 mm. The crank makes 60 ˚with the vertical.

ASSIGNMENT NO.2	
Sr. No.	Questions
1	Derive the relation for the coefficient of fluctuation of speed in terms of maximum fluctuation of energy and the kinetic energy of the flywheel at mean speed.
2	A machine shaft running at 200 rpm requires a torque increasing uniformly from 1200 Nm to 3600 Nm during1800 of rotation. It is steady at 3600 Nm for subsequent one revolution and decreases uniformly to its original value of 1200 Nm in subsequent one revolution and is again steady at 1200 Nm for the next two revolutions. This completes the cycle. The motor has a constant torque which has a rotor of mass 450 kg and 250mm radius of gyration. In addition, if it has a flywheel of mass 2000kg and 600 mm radius of gyration fitted to the shaft. Determine the power required to drive the motor and percentage fluctuation in speed
3	The effective turning moment exerted by a two stroke engine at crank shaft is T= 8000+ 1000sin2θ- 2000cos2θ where θ is the inclination of the crank to inner dead center. The mass of the flywheel is 500kg and radius of gyration is 750 mm. The engine speed is 300 rpm. Determine the power developed, the total percentage fluctuation of speed and maximum angular retardation
4	The turning moment diagram for a multi cylinder engine has been drawn to a scale of 1cm= 5000Nm torque and 1cm= 600 respectively. The intercepted areas between output torque curve and mean resistance taken in order from one end are -0.3, +4.1, -2.8, +3.2, -3.3, +2.5, -3.6, +2.8, -2.6 square cm when the engine is running at 800rpm. The engine has a stroke of 300 mm and the fluctuation of speed is not to exceed 2% of mean speed. Determine a suitable diameter of cross section of the flywheel rim for limiting value of the shaft centrifugal stress of 280 X 103 N/m2 . The material density may be assumed as 7.2 g/cm3 . Assume the thickness of the rim to be ¼ th of the width.
5	Define coefficient of fluctuation of speed for an engine.
6	How does a governor differ from that of flywheel?

ASSIGNMENT NO.3	
Sr. No.	Questions
1	What are unbalanced couples in the case of radial engines?
2	State the conditions for dynamic balancing.
3	How are rotating masses balanced? Explain with a neat sketch
4	Derive the expression for swaying couple in locomotive balancing
5	The cranks of a three cylinder locomotive are set at 1200 . The stroke is 120 mm, the length of the connecting rod is 240 mm, the mass of the reciprocating parts per cylinder is 1 Kg and the speed of the crank shaft is 2400 rpm. Determine the magnitude of primary and secondary balancing.
6	A rigid rotor has its unbalance in one plane and can be considered to consist of three masses m1 = 5 kg at an angle of 300 from mass m1 in anti clockwise direction, m2 = 3 kg at an angle of 1650 counter clockwise from m1 and m3 = 8 kg at angle 850 clockwise from m1. The radii r1 = 200mm, r2 = 80mm and r3 = 140 mm. Determine the balancing mass required at a radius of 100 mm. Specify the location of this mass with respect to m1.