AE-318: Tribology and lubrication										
L	**T**	**P**	Credit	Area		**CWS**	**PRS**	**MTE**	**ETE**	**PRE**
3	0/1	2/0	4	DEC		15	25	20	40	-

Objectives: This course aims to introduce student with general parameters for surface interaction, adhesive wear, friction between surfaces and lubrication's

AE-318: Tribology and lubrication		Contact Hours
Unit-1	**Introduction:** Surface interactions, science of rubbing surface, general consideration of parameters involved, wear rate, modeling and solution of simple problems	**8**
Unit-2	**Material properties influencing interactions:** Introduction, elastic properties, Plastic deformation properties, relation between the strength and other Properties of solids, chemical reactivity of surfaces, absorbed surface layer, Surface energy, relation between surface energy and hardness, Surface Interfacial Energies of Solids under engineering condition	**6**
Unit-3	**Surface Interaction:** Size of real contact area and effect of surface energy, size of junction, rheologial properties, Wear in tribological joints - classification, calculation methods with allowance for stiffness, wear limits, reliability of joints, simple examples, detailed study of manufacturing methods for highly reliable joints. Economic role of wear, measurement, types, and use of radiotracer techniques	**6**
Unit-4	**Adhesive wear:** Mechanism, size, shapes of transferred and wear particles, quantitative laws, equilibrium calculation of fragments under different conditions, minimum load for loose particle formation, Quantitative expression for abrasive wear, of hardness and particle size on abrasive wear rate, surface fatigue wear, brittle fracture wear, corrosive wear with types	**8**
Unit-5	**Friction:** Introduction, laws, function, properties of uncontaminated metals in air, outgassed metal surface, calculation of flash temperature using surface energy, stick slip and its prevention	**8**
Unit-6	**Lubrication:** Solid film lubrication, boundary lubrication with single and multiple penetration models, properties of lubricants, effectiveness of lubrication-intermediate temperature, behavior of a solid lubrication below melting point effect of speed, load on lubrication. Lubricants, their properties lubrication technique in vacuum, lubricant coating and its stability. Theory of electrohydrodynamic lubrication film thickness, frictional stress heat flow & temperature, service life of roller bearings	**6**
	Total	**42**

Reference Books:	
1	Gwidon, Stachowiak, Engineering Tribology 2005 Edition, Publisher-Elsevier (ISBN - 13: 9780123970473)
2	GwidonStachowiak;Experimental Methods in Tribology Publisher-Elsevier (ISBN -13: 9780444515896)
3	John Williams,Engineering Tribology OUP Publisher: Cambridge University Press (ISBN-13: 9780521609883)

Course Outcomes

CO1	To understand basics of tribology and lubrication with its parameters.
CO2	To understand material properties influencing interactions.
CO3	To understand rheological properties and Wear in tribological joint.
CO4	To understand Quantitative expression for abrasive wear
CO5	To understand Friction and its stick slip and its prevention
CO6	To understand lubrication**,** lubricant,film thickness and service life of bearing.

CO-PO/PSOMatrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	2	2	0	0	0	0	0	0	2	2	1	1
CO2	3	3	2	3	1	0	0	0	0	0	0	1	2	1	1
CO3	3	3	3	3	1	0	0	0	0	0	0	2	3	3	2
CO4	3	3	3	3	1	0	0	0	0	0	0	1	3	3	2
CO5	2	2	2	2	2	0	0	0	0	0	0	1	2	2	2