Gautam Buddha University; Greater Noida

School of Engineering (Mechanical Engineering)

Degree	Course Name	Course Code	Marks:100
M. Tech. in Design Engg.	Bearings and Rotor Dynamics	MED 507	SM+MT+ET 25+25+50
Semester	**Credits**	**L-T-P**	**Exam.**
I	3	3-0-0	3 Hours

Unit – I

Background: Tribology & bearings; Classification of bearing; Fluid film bearing and rolling bearing; Selection criteria for bearing; Materials of bearing; Introduction to geometry and functioning of the bearing.

(07 Hours)

Unit – II

Fluid Film Bearings: Lubrication issues; Film formation; Governing equations; Reynolds equation; Energy equation; Elastic deformation equation; Rheological (viscosity & density) relation; Design of hydrodynamic journal bearing; Design of hydrodynamic thrust pad bearing; Hydostatic (externally pressurized) bearing; Squeeze film bearing.

(06 Hours)

Unit – III

Rolling Bearings: Classification and selection of rolling bearing; Mounting & clearance determination in roller bearing: Expansion of recess due to press fit and thermal effect; Lubrication of roller bearing & grease selection. Dynamics of bearings in vibration study prospective. **(08 Hours)**

Unit – IV

Bearing Coefficient and Stability: Introduction to bearing coefficients (stiffness & damping); procedure for stiffness and damping calculations; Oil

whirl and oil whip; Linear and non-linear stability; Procedure for stability computation. **(07 Hours)**

Unit – V

Single & multiple degree of freedoms; Shaft with central disc; Shaft with non central disc; Rotor-bearing systems: Rotor supported on rolling element bearings; rotor supported on oil journal bearings; stability analysis (rigid rotor; flexible rotor); Rotor with several bearings and discs : Equation of motion with Rigid masses; Drive-Rotor interactions; Natural vibration and forced vibration studies. **(09 Hours)**

Unit – VI

Measurement and diagnostics in rotating machinery: Signal measurement and processing; Fault prediction such as unbalance; Misalignment; Rubbing; Bending; loose components; rotor crack and bearing faults.

(08 Hours)

Recommended Books:

1. Machine Design; Abdul Mubeen; Khanna Publishers
2. Machine Design; Shiegley; McGraw Hill
3. Design of Machine Elements; Bhandari; McGraw Hill Education
3. Machine Design by Black and Adams; McGraw Hill Education
4. Design of Machine Elements; Spotts