B.E Semester: 6 Mechanical Engineering
Subject Name: Machine Design (ME604-N)

A. Course Objective:
• To present a problem oriented in depth knowledge of Machine Design.
• To address the underlying concepts and methods behind Machine Design.

B. Teaching / Examination Scheme:

Teaching Scheme				Total Credit	Evaluation Scheme					Total
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
4	0	2	6	5	3	70	30	20	30	150

C. Detailed Syllabus:

Unit No.	Details
1	**Introduction:** Design procedure, Selection of preferred sizes, Aesthetic and Ergonomic considerations in Design, Manufacturing considerations in Design, Mechanical Properties of Materials, Effect of Alloying elements and heat treatment on properties of steels, Materials Selection in Machine Design, IS coding of steels and Cast Irons.
2	**Design Against Fluctuating Loads**: Stress Concentration, Endurance limit and Fatigue failure, Factors affecting endurance limit, S-N Diagram, Design for reversed stresses and cumulative damage, Fluctuating stresses: Soderberg, Gerber, Goodman and ModifiedGoodman criteria, Combined stresses.
3	**Design of Springs:** Classification of springs, Helical Spring: Style of ends, Stresses, Correction Factors, and Deflection, Design against static and fluctuating loads, Concentric springs, surge phenomenon. Helical Torsion and Spiral Springs, Belleville spring, shot peening of springs. Multi-Leaf Spring: Terminology, Nipping, and Design of multi-leaf spring.
4	**Belt and Chain Drives:**Selection of Belts from catalogues, Design of Pulley for flat belt drive. Timing belt selection. V-Belt Drive: Nomenclature, Selection of VBelts from catalogues. Chain Drive: Nomenclature of roller chains, Length and power rating ofchains, Design of chain drive.
5	**Pressure Vessels:** Thin cylinders and spherical vessels, Wire wound cylinders. Thick cylinders: Principal stresses in cylinder subjected to internal/external pressure, Lame's equation, Clavarion's and Bernie's equations, Autofrettage, Compounding of cylinders, Gasketted Joints, Thickness of cylindrical and spherical shells, Design of End closures, Area compensations for nozzles. Introduction to Design codes
6	**Power Screws and Threaded Joints:** Forms of thread, Single and Multiple threaded screw, Terminology of power screw, Torque requirement of lifting/lowering, Self-locking, Efficiency of threads, coefficient of friction, design of screw and nut. Basic types of screw fastening, Cap and Set screw, Bolt of Uniform strength,

	locking devices, Terminology of Screw thread, Design of turnbuckle**.**
7	**Lever:** Design and analysis of levers: Cranked, Bell crank, Foot, Rocker arm.

Total hours (Theory):64
Total hours (Practical):32
Total hours:96

D. Lesson Planning:

Sr. No.	Date/Week	Unit	Weight age	Topic No
1	1st ,2nd ,3rd	Unit 1	20%	1,2
2	4th .5th ,6th	Unit 2	20%	3
3	7th , 8th ,9th	Unit 3	20%	4,5
4	10th .11th . 12th	Unit 4	20%	6
5	13th , 14th ,15th,16th	Unit 5	20%	7

E. Instructional Method & Pedagogy

1	At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
2	Lecture may be conducted with the aid of multi-media projector, black board, OHP etc. & equal Weight age should be given to all topics while teaching and conduction of all examinations.
3	Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
4	One/Two internal exams may be conducted and total/average/best of the same may be converted toequivalent of 30 marks as a part of internal theory evaluation.
5	Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of ten marks in the overall internal evaluation.
6	Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overallinternal evaluation.
7	The course includes a laboratory, where students have an opportunity to build an appreciation for theconcept being taught in lectures. Suggested list of experiment is given below

F. List of Practical:

1	Exercise on material selection for given application
2	Design of mechanical components subjected to fluctuating loads.
3	Design of springs.
4	Design of belt drives.
5	Design of chain drives.
6	Design of pressure vessels. Exercise should include demonstration of use of codes (ASME Section VIII Div 2 and IS 2825 (1969))
7	Design of Power Screw

8	Design of Lever
9	Preparation of Design report consisting of one of the problems along with Preparation of Detail and Assembly Drawing

G. Students Learning Outcomes:

1	The student can identify different areas of Machine Design - I.
2	Can find the applications of all the areas in day to day life.

H. Text Books & Reference Books:

1	Design Of Machine Elements by V B Bhandari., Tata McGraw Hill Pub
2	Machine Design by Sharma & Agrawal., S.K.Kataria Pub.
3	Mechanical Engineering Design by Dr. Sadhusingh., Khanna Pub.
4	Machine Design by Joseph Shighley, Mc-Graw Hill
5	Elements Of Machine Design by Pandya and Shah, Charotar Publishing House
6	Machine Design Vol. I & II by Patel, Pandya, Sikh & Rajput., C.Jamnadas & Co
7	Machine Design by R K Jain, Khanna Pub.
8	Design Of Machine Elements Vol. I, II& III by Farazdak Haideri, Nirali Prakashan, Pune
9	P S G Design Data Book.