Mechanical System Design

B.E. Sem. VIII [MECH] (Elective − II)

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

1. **Design Of Cylinders and pressure vessels :**
   Thick and thin cylinders – Thin cylindrical and spherical vessels – Lame's equation – Clavarino's and Birnie's equations – Design of hydraulic and pneumatic cylinders – Auto frettage and compound cylinders – Gasketed joints in cylindrical vessels. Modes of failures in pressure vessels. Unfired pressure vessels – Classification of pressure vessels as per I. S. 2825 – categories and types of welded joints – weld joint efficiency – Corrosion, erosion and protection vessels, stresses induced in pressure vessels, materials of construction. Thickness of cylindrical and spherical shells and design of end closures as per code – Nozzles and Openings in pressure vessels –Reinforcement of openings in shell and end closures. Area compensation method – Types of vessel supports

2. **Optimum design:**
   Objectives of optimum design –Johnson's Method of Optimum Design (MOD). Adequate and optimum design. Primary, subsidiary and limit equations – Optimum design with normal specifications of simple machine elements like tension bar, transmission shaft, helical spring.– Introduction to optimum design with redundant specifications.

3. **Design of Flypress :**
   Power calculation for fly press, Design of flywheel, Fundamental equation of motion – torque analysis – disk and rimmed flywheels – Stresses in flywheel rim and spokes – Design of disc and rimmed flywheels for various applications. Standard dimensions of flywheels.

4. **Design of main component of gear pump –**
   1. Motor selection
   2. Gear design
   3. Shaft design and bearing selection
   4. Casing and bolt design
   5. Suction and delivery pipe.

5. **Design of gear boxes for machine tool applications-**
   Determination of variable speed range- graphical representation of speeds- structure diagram- deviation diagram- ray diagram- selection of optimum ray diagram- difference between number of teeth of successive gears in a change gear box- analysis of twelve speed gear box- compound ray diagram.

6. **Design of Material Handling System**
   Design of belt conveyors-- Power requirement, selection of belt, design of tension take up unit, idler pulley

Reference Books :

1. Mechanical Engineering Design (*Shigley J.E. and Mischke C.R.*) McGraw Hill Pub. Co. Ltd.
2. Mechanical design analysis (*M.F.Spotts*) Prentice Hall Inc.
3. Design of Machine Elements (*Bhandari V.B.*), Tata McGraw Hill Pub. Co. Ltd.
4. Machine Design (*Black P.H. and O. Eugene Adams*) McGraw Hill Book Co. Inc.
5. Design Data (P.S.G. College of Technology, Coimbatore.
6. I.S.: 2825 Code for unfired pressure vessels.
7. Mechanical Design Synthesis with Optmisation Applications (*Johnson R.C.*), Von-Nostrand-Reynold Pub.
8. Engineering Design (*Dieter G.E.*) McGraw Hill Inc.
9. Design of machine tools (*S.K. Basu and D.K. Pal*) Oxford and IBH Pub. Co.
10. Machine tool design (*N.K.Mehta*) Tata McGraw Hill Pub. Co.
11. Mechanical System Design (*S.P. PATIL*) JAICO students Ed., JAICO Publishing House, Delhi
12. Material Handling Equipment (*Rudenko*) M.I.R. publishers, Moscow

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