**Lesson Plan**

**Name of the faculty : Sunil**

**Discipline : Mechanical Engineering**

**Semester : 5th**

**Subject : MACHINE DESIGN**

**Lesson Plan Duration : 16 weeks**

**Work Load : (4 Periods/Week)**

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|  | **Theory** | |
| **Week** | **Lecture Day** | **Topics** |
| 1st | 1st | **Unit 1 :- Introduction**Design – Definition, Type of design, necessity of design, Comparison of designed and undesigned work |
| 2nd | Design procedure, Characteristics of a good designer |
| 3rd | Design terminology: stress, strain, factor of safety, factors affecting factor of  safety, |
| 4th | stress concentration, methods to reduce stress concentration, fatigue,  Endurance limit. |
| 2nd | 5th | General design consideration, Codes and Standards (BIS standards) |
| 6th | Engineering materials and their mechanical properties : |
| 7th | Properties of engineering materials |
| 8th | Selection of materials, criteria of material selection |
| 3rd | 9th | **Unit 2 :- Design Failure**Various design failures-maximum stress theory, maximum strain theory |
| 10th | Classification of loads |
| 11th | Design under tensile loads. |
| 12th | Design under compressive and torsional loads. |
| 4th | 13th | **Unit 3**:- **Design of Shaft** Type of shaft, shaft materials, |
| 14th | Type of loading on shaft, standard sizes of shaft available |
| 15th | Shaft subjected to torsion only, determination of shaft diameter (hollow shaft) on the basis of : Strength criterion |
| 16th | Shaft subjected to torsion only, determination of shaft diameter (Solid shaft) on the basis of : Strength criterion |
| 5th | 17th | Shaft subjected to torsion only, determination of shaft diameter (hollow shaft) on the basis of : Rigidity criterion |
| 18th | Shaft subjected to torsion only, determination of shaft diameter (Solid shaft) on the basis of : Rigidity criterion |
| 19th | **Ist Class Test** |
| 20th | Determination of shaft diameter (hollow and solid shaft) subjected to  bending |
| 6th | 21st | Determination of shaft diameter (hollow and solid shaft) subjected to combined torsion and bending. |
| 22nd | **Unit 4:- Design of Key**Types of key, materials of key, functions of key |
| 23rd | Failure of key (by Shearing and Crushing). Design of key (Determination of key dimension) |
| 24th | **Sessional Test- I** |
| 7th | 25th | Effect of keyway on shaft strength. (Figures and problems). |
| 26th | **Unit 5 :- Design of Joints**Types of joints - Temporary and permanent joints, utility of various joints |
| 27th | Temporary Joint: Knuckle Joints – Different parts of the joint, material used for the joint, |
| 28th | Type of knuckle Joint, design of the knuckle joint. (Figures and problems). |
| 8th | 29th | Cotter Joint – Different parts of the spigot Joints |
| 30th | Different parts of the socket joints, |
| 31st | Design of spigot and socket joint. |
| 32nd | Permanent Joint: Welded Joint - Welding symbols. |
| 9th | 33rd | Type of welded joint, strength of parallel and transverse fillet welds |
| 34th | Strength of combined parallel and transverse weld |
| 35th | Riveted Joints. : Rivet materials, Rivet heads |
| 36th | Leak proofing of riveted joint – caulking and fullering |
| 10th | 37th | Different modes of rivet joint failure |
| 38th | Design of riveted Lap joint |
| 39th | Design of riveted Butt joint |
| 40th | Design of single riveted joint , **2nd Class test** |
| 11th | 41st | Design of multi riveted joint |
| 42nd | **Unit-6 Design of Flange Coupling** Necessity of a coupling |
| 43rd | advantages of a coupling |
| 44th | **Sessional Test- II** |
| 12th | 45th | types of couplings |
| 46th | Design of muff coupling, |
| 47th | Design of protected type flange coupling |
| 48th | Design of unprotected type flange coupling |
| 13th | 49th | **Unit-7 Design of Screwed Joints**Introduction to Screw Joints |
| 50th | Advantages and Disadvantages of screw joints |
| 51st | Location of screw joints. |
| 52nd | **3rd Class Test** |
| 14th | 53rd | Important terms used in screw threads |
| 54th | Designation of screw threads |
| 55th | Initial stresses due to screw up forces, |
| 56th | Stresses due to combined forces |
| 15th | 57th | Design of power screws (Press Screw) |
| 58th | Design of power screws (screw jack) |
| 59th | Design of power screws (screw clamp)) |
| 60th | **Sessional Test- III** |