Lesson Plan

Name of the Faculty :Preeti Discipline :Mechanical Engg.

Semester :4th

Subject :HPS

Lesson plan duration :16 weeks (from 06th march, 2023 to 23 June, 2023)

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| **Week** | **Theory** | | **Practical** | |
| Lecture Day | Topic (including assignments /tests) | Practical Day | Topic |
| Week 1 | 1st | **Introduction:** Fluid, types of fluid; properties of fluid: mass density, weight  density (specific weight) | 1st | Measurement of pressure head by employing Piezometer tube |
| 2nd | specific volume, capillarity, specific gravity, viscosity, compressibility, |
| 3rd | Surface tension, kinematic viscosity and  dynamic viscosity and their units. |
| Week 2 | 1st | Revision & Mock Test | 1st | Measurement of pressure head by employing Simple U-tube manometer |
| 2nd | **Pressure and its Measurement:** Concept of pressure (Atmospheric Pressure, gauge  pressure, absolutepressure), Pascal’s Law, Static Pressure |
| 3rd | Pressure measuring devices: peizometer tube manometers - simple U-tube,  differential single column |
| Week 3 | 1st | inverted U-tube, micro manometer including simple problems | 1st | Measurement of pressure head by employing Bourdon.s tube pressure gauge |
| 2nd | Bourdon pressure gauge, Diaphragm pressure gauge, dead weight pressure Gauge |
| 3rd | Assignment on Pressure measuring devices |
| Week 4 | 1st | Test | 1st | Verification of Bernoulli’s theorem. |
| 2nd | Revision of Chapter 1 |
| 3rd | Revision of Chapter 2 |
| Week 5 | 1st | **Flow of Fluids:** Types of fluid flow – steady and unsteady, uniform and non- uniform, laminar and turbulent | 1st | Measurement of flow by using venturimeter. |
| 2nd | Rate of flow and their units; continuity equation of flow; potential energy  of a flowing fluid; total head |
| 3rd | Bernoulli’s theorem (statement and proof) and its applications |
| Week 6 | 1st | Assignment on Bernoulli’s theorem |  | To find out the value of coefficient of discharge for a venturimeter |
| 2nd | Discharge measurement with the help of venturi-meter, orifice meter, pitot-tube |
| 3rd | limitations of Bernoulli’s theorem |

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| Week 7 | 1st | Numerical Practice on simple problems | 1st | To find coefficient of friction for a pipe (Darcy’s equation). |
| 2nd | Assignments on Numerical & Revision |
| 3rd | Test |
| Week 8 | 1st | **Flow through Pipes:** Definition of pipe flow, wetted perimeter, hydraulic mean depth, hydraulicgradient loss of head due to friction; Chezy’s equation and Darcy’s equation of head loss (without proof) | 1st | To study a single stage centrifugal pump and reciprocating pump for constructional details with the help of cut section models. |
| 2nd | Reynold’s number and its effect on  pipe friction; siphon, Nozzle - definition, |
| 3rd | velocity of liquid flowing through the nozzle, power developed. Water  hammer, anchor block, syphon, surge tank |
| Week 9 | 1st | Loss of head in pipes due to sudden enlargement, sudden contraction | 1st | Study the working of Pelton wheel, Francis and Kaplan turbine with the help of working model |
| 2nd | obstruction on flow path, change of  direction and pipe fittings |
| 3rd | Revision |
| Week 10 | 1st | Assignment on loss of heads | 1st | Study of hydraulic circuit of any available machine or working model |
| 2nd | Test |
| 3rd | **Flow through Orifices**  Cc, Cv, Cd, flow through drowned, partially  drowned orifices |
| Week 11 | 1st | time for emptying a tank through a circular orifice | 1st | Study of pneumatic circuit of any available machine or working model |
| 2nd | Numerical practice |
| 3rd | Assignment on Coefficient of discharges |
| Week 12 | 1st | **Hydraulic Machines:** Description, operation and application of hydraulic  systems – hydraulic ram, hydraulic jack, hydraulic brake | 1st | Study of pneumatic circuit of any available machine or working model |
| 2nd | hydraulic accumulator, hydraulic door closer, hydraulic press, selection of  specification of above systems for different applications. |
| 3rd | Assignment on Hydraulic Machines |
| Week 13 | 1st | **Water Turbines and Pumps:** Concept of a turbine, types of turbines –impulse and reaction type, Construction and working of  pelton wheel, Francis turbine, Propeller and Kaplan turbines | 1st | Viva question |
| 2nd | Unit speed, unit power, unit discharge, specific speed of turbines, selection of  turbines based on specific speed. |
| 3rd | Concept of hydraulic pump, single acting reciprocating pump, vane, screw and gear pumps |
| Week 14 | 1st | 6.1 Introduction to oil power hydraulics and pneumatic system. Relative Merits and Demerits as oil power hydraulic and pneumatic system. | 1st | Viva question |
| 2nd | 6.2 Industrial applications of oil power hydraulic and pneumatic system |
| 3rd | . 6.3 Basic components of hydraulic system, definition and functions of each component in a hydraulic circuit. Hydraulic oils- Classification and their properties.  Seals and packing- classification of seals, sealing materials. |
| Week 15 | 1st | 6.4 Maintenance of hydraulic system: common faults in hydraulic system, simple visual checks of oil, causes of contamination, preventive measures. | 1st | Viva question |
| 2nd | * 1. Basic Components of Pneumatic Systems , definition and functions of each component in a Pneumatic circuit. Necessity of Filter, Regulator and Regulator(FLR).   2. Common problems in pneumatic systems. Maintenance schedule of pneumatic systems. |
| 3rd | * 1. Basic Components of Pneumatic Systems |
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| Week 16 | 1st | definition and functions of each component in a Pneumatic circuit | 1st | Viva question |
| 2nd | * 1. ,. Necessity of Filter, Regulator and Regulator(FLR). |
| 3rd | Common problems in pneumatic systems. Maintenance schedule of pneumatic systems. |