LESSON PLAN

Name of Faculty: Bharat Bhushan

Discipline:Mechanical Engg.

Semester:4th

Subject: Hydraulic & Pneumatic Lesson Plan Duration:15Weeks

**WorkLoad:(3+2)**

|  |  |
| --- | --- |
|  | **THEORY** |
| **WEEK** | **LECT** | **TOPIC** | **DATE** |
| **1** | 1 | **UNIT I**1. Properties of fluidDensity, Specific gravity, Specific Weight, Specific Volume, Dynamic Viscosity, Kinematic |  |
| **2** | Viscosity, Surface tension, Capillarity, Vapour Pressure, Compressibility. Fluid Pressure &Pressure Measurement: Fluid pressure, of Pascal’s law and its applications Pressure head, |  |
| **3** | Pressure intensity, Concept of vacuum and gauge pressures, atmospheric pressure,  |  |
| **2** | **4** |  Absolute pressure, Piezometer |  |
| **5** | Simple U- tube Manometer and differential manometers, Bourdan’spressure gauge, |  |
| **6** | Concept of Total pressure on immersed bodies, center of pressure,  |  |
| **3** | **7** | Simpleproblems on fluid properties and Manometers. |  |
| **8** | REVISION |  |
| **9** | **UNIT II**2. Fluid FlowTypes of fluid flows, Path line and Stream line, Continuity equation Bernoulli’s theorem, |  |
| **4** |  10 | Principle of operation of Venturimeter, Orifice meter and Pitot tube,  |  |
| **11** | Derivations for discharge,coefficient of discharge and numerical problems. |  |
| **12** | Flow Through Pipes: Laminar and turbulent flows; |  |
| **5** | **13** | Darcy’s equation and Chezy’s equation forfrictional losses, Minor losses in pipes, wetted perimeter |  |
| **14** | Hydraulic gradient and total gradient line |  |
|  | **15** | Reynold’s number and its effect on pipe friction; Water hammer. Simple numerical |  |
| **6** | **16** | problems to estimate major and minor losses |  |
| **17** |  REVISION |  |
| **18** | UNIT III3. Hydraulic TurbinesImpact of jet on fixed vertical and moving vertical flat plates, Hydraulic Turbines: |  |
| **7** | **19** | Classification of hydraulic turbines,  |  |
| **20** | Selection of turbine on the basis of head and dischargeavailable |  |
| **21** |  Construction and working principle of Pelton wheel, |  |
| **8** | **22** | Francis and Kaplan turbines.other Machines working construction and applications of hydraulic press,  |  |
| **23** | hydraulic jack,hydraulic accumulator and hydraulic ram. |  |
| **24** | REVISION |  |
| **9** | **25** | **UNIT IV**4. Pumps Centrifugal Pumps: Principle of working and applications  |  |
| **26** | Types of casings and impellers |  |
| **27** | Concept of multistage, Priming and its methods, |  |
| **10** | **28** | Cavitation, Manometric head, Work done, |  |
| **29** | Manometric efficiency, Overall efficiency |  |
| **30** | Reciprocating Pumps: Construction |  |
| **11** | **31** | working principle and applications of single and doubleacting reciprocating pumps, Concept of Slip, |  |
| **32** | Negative slip, Cavitation and separation. |  |
| **33** | REVISION |  |
| **12** | **34** | UNIT V5. Hydraulic and Pneumatic systemsIntroduction to oil power hydraulic and pneumatic system.  |  |
| **35** | Relative Merits and Demerits of oil. |  |
| **36** | power hydraulic and pneumatic system.  |  |
| **13** | **37** | Basic components of hydraulic system, function of eachcomponent in a hydraulic circuit such as Oil reservoirs, |  |
| **38** | connectors, pipes, motors andpumps(power pack), Filters, etc. |  |
| **39** | Components of Pneumatic Systems : Basic components – function of each component. |  |
| **14** | **40** | Air compressors, Air cylinder and their types  |  |
| **41** | (single acting, double acting, piston type,diaphragm type, tandem cylinder, double ended cylinder). |  |
| **42** | Air filter, regulator and lubricator –their necessity in pneumatic circuit.  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **15** | **43** | common faults in hydraulic system and pneumatic systemsand remedial action. |  |
| **44** | **Revision** |  |
| **45** | **Revision** |  |

|  |
| --- |
| **PRACTICAL** |
| **TURN** | **EXPERIMENT** | **DATE** |
| **1** |  **1**. Measurement of pressure head usingi) Piezometer tubeii) Simple U-tube manometeriii) Bourdon.s tube pressure gauge |  |
| **2** | **Repeat of Experiment-1** |  |
| **3** | **2.** Verification of Bernoulli’s theorem |  |
| **4** | **3.** Determination of Coefficient of Discharge of venturimeter**.** |  |
| **5** |  **4**.Determination of Coefficient of Discharge, coefficient of contraction and coefficient of velocity of Orifice meter.  |  |
| **6** |  **5.** Determination of coefficient of friction of flow through pipes((Darcy’s equation) |  |
| **7** |  **6.** Determination of minor losses of flow through pipes. (Chezy's Equation) |  |
| 8 | **Repeat of Experiment-6** |  |
|  |  **7.** To determine overall efficiency of a single stage centrifugal pump. |  |
| **10** | **8.** Demo of working of Pelton wheel, Francis and Kaplan turbine with the help of working model. |  |
| **11** |  **9.** Draw hydraulic circuit of any available machine or working model |  |
| **12** | **Repeat of Experiment-9** |  |
| **13** |  **10.** Draw pneumatic circuit of any available machine or working model |  |
| **14** | **Repeat of Experiment-10** |  |
| **15** | **VIVA** |  |