LESSON PLAN

Name of Faculty: Bharat Bhushan

Discipline:Mechanical Engg.

Semester:4th

Subject: Hydraulic & Pneumatic Lesson Plan Duration:15Weeks

**WorkLoad:(3+2)**

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|  | | **THEORY** | | |
| **WEEK** | | **LECT** | **TOPIC** | **DATE** |
| **1** | | 1 | **UNIT I**  1. Properties of fluid  Density, 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’s  pressure gauge, |  |
| **6** | Concept of Total pressure on immersed bodies, center of pressure, |  |
| **3** | | **7** | Simple  problems on fluid properties and Manometers. |  |
| **8** | REVISION |  |
| **9** | **UNIT II**  2. Fluid Flow  Types 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 for  frictional 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 III  3. Hydraulic Turbines  Impact 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 discharge  available |  |
| **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 double  acting reciprocating pumps, Concept of Slip, |  |
| **32** | | Negative slip, Cavitation and separation. |  |
| **33** | | REVISION |  |
| **12** | **34** | | UNIT V  5. Hydraulic and Pneumatic systems  Introduction 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 each  component in a hydraulic circuit such as Oil reservoirs, |  |
| **38** | | connectors, pipes, motors and  pumps(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. |  |

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

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| **PRACTICAL** | | |
| **TURN** | **EXPERIMENT** | **DATE** |
| **1** | **1**. Measurement of pressure head using  i) Piezometer tube  ii) Simple U-tube manometer  iii) 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** |  |