d) Explain the working of a hydraulic crane with the help of a neat sketch.

OR

Explain the differential type of hydraulic accumulator with a neat sketch.

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Roll No ....

ME - 502

B.E. V Semester
Examination, June 2016
Turbo Machinery

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) What do you understand by turbo machines.
   b) Define degree of reaction.
   c) Write the difference between impulse and reaction turbine.
   d) Derive Euler's equation of motion for one dimensional flow.

OR

Derive steady flow energy equation in a control volume.

Unit - II

2. a) Give the detailed classification of steam turbines.
   b) Enlist the advantages of velocity compounded impulse turbine.

c) Derive an equation for height of turbine blade.

d) In an impulse turbine the following observations are recorded: Steam velocity = 500m/s, Blade Speed = 200m/s, exit angle of moving blade = 25° measured from tangential direction, Nozzle angle = 20°, Neglecting the effect of friction, when passing through blade passages, calculate:

i) Inlet angle of moving blade

ii) Exit velocity and direction

iii) Work done per kg of steam,

iv) Blade efficiency

OR

Discuss the performance characteristics of steam turbines.

Unit - III

3. a) Define hydraulic machines, hydraulic turbines and pumps.

b) Define hydraulic efficiency and mechanical efficiency.

c) What is the purpose of draft tube? List any two types of draft tubes with neat sketch.

d) Describe with the help of a neat sketch, the governing of a reaction turbine.

OR

With the help of a neat sketch, describe the working of a kaplan turbine.

Unit - IV

4. a) Define Fans and Blowers.

b) Write the advantages and disadvantages of centrifugal compressors.

c) Draw and explain the velocity triangle at the inlet and exit for the axil flow compressor.

d) An axial flow compressor has a mean diameter of 60cm and runs at 15000 rpm. If the actual temperature rise and pressure ratio developed are 30°C and 1.3 respectively. Determine :

i) Power required to drive the compressor while delivery 57kg/s of air, assuming mechanical efficiency 86% and initial temperature of 35°C.

ii) The stage efficiency; and

iii) The degree of reaction if the temperature at the rotor exit is 55°C.

OR

Draw and explain characteristic curves of fan.

Unit - V

5. a) Define slip of a fluid coupling. Show that slip, $S = 1 - \eta$. Where η is the fluid coupling efficiency.

b) What is a torque converter? Draw its neat sketch.

c) With the help of neat sketch discuss the main parts of reciprocating pump.