

**(DEE 225)**

**B.Tech. DEGREE EXAMINATION, MAY - 2015**

**(Examination at the end of Second Year)**

**Electricals and Electronics**

**Paper - V : PRIME MOVERS AND PUMPS**

**Time : 3 Hours**

**Maximum Marks : 75**

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**Answer question No.1 compulsory**

**(15)**

**Answer any ONE question from each unit**

**(4 × 15 = 60)**

- 1) a) Define Newton's law of viscosity.
- b) Define jet propulsion.
- c) What is priming?
- d) Define Cavitation.
- e) Differentiate between Pump and Turbine.
- f) Define the flow ratio.
- g) What are the uses of Draft tube?
- h) Classifications of turbine.
- i) State the first law of thermo dynamics.
- j) Define the Open System.
- k) Write the formula for diesel cycle efficiency in terms of compression ratio.
- l) Draw the P-V and T-S diagram for the Otto cycle.
- m) Define the compression ratio.

- n) Define speed ratio of turbine.
- o) What is the use of regeneration?

### UNIT - I

- 2) a) One liter of crude oil weights 9.6N. Calculate its specific weight, density and specify gravity.
- b) Explain the different properties of fluids.

OR

- 3) a) Derive the expression for force on curved plate when the plate is moving in the direction of jet.
- b) A jet of water of diameter 7.5cm strikes a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8m/s in the direction of the jet. The jet is deflected through an angle of 165°. Assuming the plate smooth find.
  - i) Force exerted on the plate in the direction of jet.
  - ii) Power of the jet.
  - iii) Efficiency of the jet.

### UNIT - II

- 4) Obtain an expression for the work done per second by water on the runner of a pelton wheel. Hence derive an expression for maximum efficiency of the pelton wheel giving the relationship between the jet speed and bucket speed.

OR

- 5) A Francis turbine has an inlet diameter of 2.0 m and an outlet diameter of 1.2 m. The width of the blades is constant at 0.2 m. The runner rotates at a speed of 250 rpm with a discharge of 8 m<sup>3</sup>/s. The vanes are radial at the inlet and the discharge is radially outwards at the outlet. Calculate the angle of guide vane at inlet and blade angle at the outlet.

### UNIT - III

- 6) a) What do you understand by macroscopic and microscopic viewpoints?
- b) State first law of thermodynamics and give any two corollaries.

OR

- 7) a) Compare the Otto, Diesel and dual cycle based on maximum pressure and maximum temperature.
- b) An ideal Otto cycle has a compression ratio of 9 at the beginning of the compression process the air is at 100 kpa and 300 k, and the cylinder volume is 8000 cm<sup>3</sup>, and 7.5 kJ of heat is added during the heat addition process. Accounting for variation of specific heats of air with temperature, determine.

- i) Maximum temperature and pressure which occur during the cycle.
- ii) Net work output
- iii) Thermal efficiency
- iv) M.E.P. of the cycle.

#### UNIT - IV

- 8)** a) Explain the working principle of 4 stroke single cylinder CI engine with a neat sketch.  
b) Briefly explain the performance parameters of I.C. Engines.

OR

- 9)** a) Explain with the help of neat diagram a single stage impulse turbine. Also explain the pressure and velocity variations along the axial direction.  
b) Explain the working principle of a closed cycle gas turbine with neat sketch.

