

Code: R7311302

**R7**

B.Tech III Year I Semester (R07) Supplementary Examinations, May 2013

**PRIME MOVERS AND MECHANICAL COMPONENTS**

(Electronics and Control Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE questions  
All questions carry equal marks

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- 1 (a) With the help of characteristic curves. Explain the working of Francis turbine.  
(b) At a hydropower plant the turbine operates under a head of 100 m and consumer water at the rate of  $12 \text{ m}^3/\text{sec}$ . If the turbine runs at 260 rpm and gives an efficiency of 89%. Find the specific speed of the turbine.
- 2 (a) Explain in detail the working of a single-stage centrifugal pump with suitable sketches.  
(b) A centrifugal pump has an impeller of outer diameter 30 cm and outer width of 5 cm. The velocity of flow through the impeller is constant at 2.5 m/sec. The impeller vane is radial at the outlet. The speed of impeller is 100 rpm, and manometer efficiency is 87%.  
Calculate: (i) Head developed and (ii) Discharge.
- 3 (a) Discuss in detail about the velox boiler.  
(b) What are super critical boilers? Explain them briefly.
- 4 Draw the block diagram of steam power plant showing all the components with a brief mention of their functions.
- 5 (a) Explain in detail about the principle of operation of single-stage reaction turbines.  
(b) Describe briefly about the Rankine cycle.
- 6 (a) Draw the regenerative gas turbine power cycle and derive its efficiency.  
(b) Explain about the ideal and actual cycle of a gas turbine plant.
- 7 (a) Discuss about the hydraulic pump duty check control valves.  
(b) Explain about the rotary actuators with neat sketch.
- 8 Write short notes on the following:
  - (a) Degree of freedom.
  - (b) Kinematics chains.
  - (c) Mechanical constraints.

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