

**II B. Tech I Semester Supplementary Examinations, May - 2018**  
**THERMAL AND HYDRO PRIME MOVERS**  
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **Four** Questions from **Part-B**
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**PART -A**

1. a) Explain the importance of cooling and lubrication in IC engine.
- b) Discuss about Carnot cycle.
- c) Discuss about regeneration system used in gas turbine plant.
- d) Differentiate between reciprocating and centrifugal pumps.
- e) What is governing? Why it is required for hydraulic turbines?
- f) Discuss about base load and peak load power plants.

**PART -B**

2. a) Explain in detail the valve timing diagram of four stroke SI engine.
- b) What is the necessity of a carburetor in a petrol engine? With a neat sketch explain the working of a simple carburetor and write its limitations.
3. a) Explain the working of steam power plant with reheating system.
- b) The nozzles of a Delaval steam turbine are supplied with dry saturated steam at a pressure of 9 bar. The pressure at the outlet is 1 bar. The turbine has two nozzles with a throat diameter of 2.5 mm. Assuming nozzle efficiency as 90% and that of turbine rotor 35%, find the quality of steam used per hour and the power developed.
4. a) With a neat sketch explain the working of closed cycle gas turbine plant.
- b) The air enters the compressor of an open cycle constant pressure gas turbine at a pressure of 1 bar and temperature of 20°C. The pressure of the air after compression is 4 bar. The isentropic efficiencies of compressor and turbine are 80% and 85% respectively. The air-fuel ratio used is 90 : 1. If flow rate of air is 3.0 kg/s, find :(i) Power developed.(ii) Thermal efficiency of the cycle. Assume  $C_p = 1.0$  kJ/kg K and  $\gamma = 1.4$  for air and gases. Calorific value of fuel = 41800 kJ/kg.
5. a) A jet of water of 75 mm diameter strikes a curved vane at its center with a velocity of 20 m/s. The curved vane is moving with a velocity of 8 m/s in the direction of jet. Find the force exerted on the plate in the direction of the jet, power and efficiency of the jet. Assume the plate to be smooth.
- b) Explain the working of a centrifugal pump with a neat diagram showing all the components.



6. a) Explain the construction and working of Pelton wheel.
- b) A Pelton wheel is to be designed for the following specifications:  
Shaft Power of the wheel = 115 kW, Head = 72 meters, speed = 240 rpm, overall efficiency = 85%, Determine the following: i) The wheel diameter, ii) Diameter of the jet, iii) size of the bucket, iv) number of buckets on the wheel. Take  $C_v = 0.98$ , speed ratio = 0.45.
7. a) Draw the general layout of a hydro electric power plant and explain its construction and working.
- b) The annual peak load of 30 MW power plant is 25 MW. The loads having maximum demands of 10 MW, 8.5 MW, 5 MW and 4.5 MW are connected to the power plant. The annual load factor is 45%. Find i) Average load on the power plant, ii) Energy supplied per year, iii) Demand factor, iv) Diversity factor.

