SUBJECT CODE:- 334
FACULTY OF ENGINEERING AND TECHNOLOGY
B.E.(Mech) Examination Nov/Dec 2015
Turbo Machines
(Revised)

[Time: Three Hours]   [Max. Marks: 80]

"Please check whether you have got the right question paper."
N.B i) Answer three questions from each section.
     ii) Use of steam tables, Mollier charts, non-programmable calculator is permitted.   ,
     iii) Assume suitable data, if necessary.

Section A

Q.1 a) Define turbo machines and give the classification in brief.   06
     b) Explain how the principle of dimensional analysis is applied to the turbo machines and explain their   07
        significance.

Q.2 a) Show that a curve radial vane the work done per second is given by, $paV[V_{w1}u_1 \pm V_{w2}u_2]$ the notation   06
        carry usual meaning.
     b) A plate is acted upon at its centre by a jet of water of diameter 20mm with a velocity of 20m/s. the plate   07
        is hinged and is deflected through an angle of 15^0. Find the weight of the plate. It the plate is not allowed
        to swing, what will be the force required at the lower edge of the plate to keep the plate in vertical
        position.

Q.3 a) Define and explain hydraulic efficiency, mechanical efficiency and overall efficiency of a turbine.   06
     b) What do you mean by the characteristic curve of turbine? Name the important types of characteristics   07
        curves.

Q.4 A Pelton wheel is to be designed for a head of 60 m when running at 200 r.p.m. the Pelton wheel develops 95.64   13
     kW shaft power. The velocity of buckets =0.45 times the velocity of the jet, overall efficiency =0.85 and co-
     efficient of the velocity is equal to 0.98. find
        a) diameter of jet   b) diameter of wheel   c) width and depth of buckets and
          d) Number of buckets on the wheel.

Q.5 Write short note on any three of the followings.   14
              a) Types of draft tubes and its significance
              b) Reaction turbine
              c) Propeller turbine
              d) Selection of turbine for particular case

Section-B

Q.6 a) Define cavitation. What are the effects of caviation? Give the necessary precautions against cavitation.   06
     b) A centrifugal pump is running at 1000 r.p.m. the outlet vane angle of the impeller is 45^0 and velocity of
        flow at outlet is 2.5m/s. the discharge through the pump is 200 litters/s. when the pump is working
        against a total head of 20m. if the manometric efficiency of the pump is 80% determine: 07
          i) Outside diameter of the impeller and   ii) the width of the impeller at outlet.

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Q.7 In a single row wheel impulse turbine the mean diameter of the blades is 1.05 m and the speed is 300 r. p. m. the 13 nozzle angle is 20^0 and the ratio of blade speed to steam speed is 0.45 and the relative velocity and outlet from the blades to that at inlet is 0.85. The outlet angle is made 3^0 less than the inlet angle. The steam flows is 10 kg/s. draw the velocity diagram for the blade and determine the following.
    a) Tangential thrust on the blades
    b) Axial thrust on the blades
    c) Power developed in the blades
    d) Blade efficiency.

Q.8   a) Sketch Brayton cycle on p-v and T-s plot and derive a relation for its thermal efficiency in terms of   06 pressure ration.
    b) Discuss the influence of reheating, regeneration and intercooling on the performance of gas turbine cycle. 07

Q.9   a) Why is compounding of steam turbine necessary? Describe with neat sketch the pressure compounding of 06 steam turbine.
    b) What do you mean by pump characteristics? Explain briefly the uses of such characteristics.   07

Q.10 Write short notes on any three of followings.   14
    1. Priming in centrifugal pump
    2. Stirling cycle
    3. Nozzles and diffusers
    4. Applications of gas turbines.

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