FACULTY OF ENGINEERING
B.E. 3/4 (Prod.) II Semester (Main) Examination, May/June 2012
TURBO MACHINERY

Time: 3 Hours]

[Max. Marks : 75

Note : Answer **all** questions from Part **A**, Answer **any five** questions from Part **B**.

PART – A   25

1. Write advantages of aerofoil blade over a flat blade. Define chord, leading and trailing edge with neat sketch of an aerofoil.   3

2. Write the expressions for force for a water jet of velocity 'V' striking a fixed moving vane at its centre.   2

3. Explain the phenomenon of cavitation.   3

4. Differentiate axial and centrifugal compressors.   3

5. Explain the significance of critical pressure ratio in steam nozzles.   2

6. Differentiate impulse and reaction steam turbines.   3

7. Explain the function of casing in Pelton turbine.   2

8. How do you select the type of hydraulic turbine for a given specific speed ?   2

9. Differentiate open and closed gas turbines.   3

10. Sketch Brayton cycle on T-S diagram.   2

PART – B   (5×10=50)

11. a) A jet of water, 10 cm diameter and having a velocity of 15 m/s impinges at the centre of a hemispherical vane. The linear velocity of the vane is 5m/s in the direction of the jet. Find

    i) Force exerted on the vane

    ii) Work done and

    iii) Efficiency   5

  b) Write short notes on losses in turbomachines.   5

12. A centrifugal pump has impeller 30 cm diameter and 1.5 cm width at outlet. The velocity of water at inlet is radial, the vanes are curved back at an angle of 30° at outlet. While running at 1000 rpm, the pump delivers 40 liters/second with 85% manometric efficiency and 75% overall efficiency. Calculate the head generated by the pump and input power. 10

13. An inward flow reaction turbine works under a total head of 28 m. The velocity of wheel periphery at inlet is 15m/s. The outlet pipe of the turbine is 30 cm in diameter and the turbine is supplied with 250 liters of water per second. The radial velocity of flow through the wheel is same as velocity in outlet pipe. Neglecting friction, determine

   i) vane angle at inlet

   ii) guide vane angle

   iii) power of turbine. 10

14. In a De-Lavel turbine, the steam enters the wheel through a nozzle with a velocity of 500 m/s and at angle of the 20° to the direction of motion of the blade. The blade speed is 200 m/s and the exit angle of the moving blade is 25°. Find the inlet angle of the moving blade, exit velocity of steam and its direction and work done per kg of steam. 10

15. In a gas turbine plant, the intake temperature and pressure are 1bar and 18° C respectively. The air is then compressed to a pressure of 4.1 bar by a compressor, whose isentropic efficiency is 80%. The temperature of the gas is raised to 645° C in combustion chamber. If thermal efficiency of the plant is 19%, calculate the isentropic efficiency of the turbine. 10

16. a) Explain velocity compounding and pressure compounding in steam turbines. 5

    b) State the methods of improving gas turbine cycle efficiency. Explain any one method with h-s diagram. 5

17. a) Explain the function of draft tube and draw different types of draft tubes. 5

    b) Write short notes on losses in turbomachines. 5

500