

**II B. TECH II SEMESTER REGULAR EXAMINATIONS, AUGUST 2021
THERMAL AND HYDRO PRIME MOVERS**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 60

Note: Answer **ONE** question from each Unit (**5 × 12 = 60 Marks**)

UNIT - I

1. a) Define the various thermodynamic systems, path function and point function. [6M]
b) State and explain Second law of thermodynamics. [6M]

(OR)

2. a) Define the adiabatic process and derive the adiabatic law $pV^\gamma=c$. [6M]
b) When a stationary mass of gas was compressed without friction at constant pressure its initial state of 0.4m^3 and 0.105 MPa was found to change to final state of 0.20 m^3 and 0.105 MPa . There was a transfer of 42.5 kJ of heat from the gas during the process. How much did the internal energy of the gas change. [6M]

UNIT – II

3. a) Compare Otto, Diesel and Dual Cycles. [6M]
b) Explain the forced circulation cooling system with a neat sketch. [6M]

(OR)

4. a) Describe the construction and working principle of an internal combustion engine and list its parts with a neat sketch. [6M]
b) List out the Differences between closed-cycle and open-cycle gas turbines. [6M]

UNIT – III

5. a) Draw the velocity-triangle diagram for an impulse turbine blade and derive the expressions for work done and axial thrust. [8M]
b) Explain velocity compounding in an impulse turbine. [4M]

(OR)

6. a) A single-stage impulse turbine is supplied with steam at 4 bar and 160°C and it is exhausted at a condenser pressure of 0.15 bar at the rate of 60 kg/min . The steam expands in a nozzle with an efficiency of 90% . The blade speed is 250 m/s and the nozzles are inclined at 20° to the plane of the wheel. The blade angle at the exit of the moving blade is 30° . Neglecting friction losses in the moving blades, determine, (a) Steam jet velocity, (b) Power developed, (c) Blade efficiency, (d) Stage efficiency [8M]
b) Why the steam turbines are compounded? Explain. [4M]

UNIT –IV

7. a) Explain briefly about the kinematic and dynamic viscosities and state their units of measurements. [6M]
b) Describe about the Pascal's law and derive an expression for the pressure variation in a fluid at rest condition. [6M]

(OR)

8. a) Describe the Euler equation of motion and derive the Bernoulli's equation from it. [6M]
b) Differentiate between the simple manometer and a differential manometer with neat sketches. [6M]

UNIT –V

9. a) Derive an expression for the force exerted by the jet on stationary inclined plate. [6M]
b) Explain about the classification of the hydraulic turbines and discuss its different efficiencies. [6M]

(OR)

10. a) A jet of water of diameter 50mm strikes a fixed plate in such a way that the angle between the plate and the jet is 30° . The force exerted in the direction of the jet is 1471.5N. Determine the rate of flow of water. [6M]
b) Illustrate the different parts of the Pelton turbine. [6M]

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