

LO-3 → To define thermal conductivity, compound resistance in series and Heat flow through cylinder and sphere.

Content → Thermal conductivity, variation of thermal conductivity with temperature, steady state condition through flat slab, compound resistance in series, Heat flow through a cylinder and sphere, logarithmic mean radius and critical radius of insulations.

Method of Assessment → External, End Semester theory exam.

Teaching hr → 05 marks - 05

LO-4 → To Determination of thermal conductivity of Insulating powder and metal bar.

Content → Thermal conductivity, variation of thermal conductivity with temperature, Fourier's law, Heat flow through sphere

Method of Assessment → Internal, practical, lab work,

Teaching hr - 05 mark - 10

(3)

LO-5 → To determination of the total thermal conductivity and thermal resistance of given compound in series.

content →

compound resistance in series.

Fourier's law, conduction, heat flux,

method of Assessment →

External, End semester practical exam,

Teaching hr → 05

marks → 10

CO2 → To understanding the basic principles and concept of convection in various phase.

LO-6 → To explain the LMTD and Enthalpy balance in heat exchangers and total condenser,

content →

Heat exchange equipments, approaches temperature range, counter and co-current flow, temperature length curve, LMTD [logarithmic mean temperature difference], Enthalpy balance in heat exchangers and total condenser,

method of Assessment → Internal, ~~End semester~~

pen paper test, mid sem test,

Teaching hr → 10

marks → 05

LO7 → To calculation of overall coefficient from individual coefficient, and fouling factors.

Content →

Rate of heat transfer, heat flux, average temperature of fluid stream, overall heat transfer coefficient, calculation of overall coefficient, from individual coefficient. resistance from overall coefficient, fouling factors, controlling resistance.

Method of Assessment → External, End Semester theory exam.

Teaching hr → 05

Marks → 05

LO-8 → To Determination of Heat Transfer by Natural convection process.

Content → laminar flow, Natural convection,

Std Sieder-Tate equation, Dittus-Boelter equation, Thermal boundary layer,

Method of Assessment → External, Practical exam, end semester.

Teaching hr → 05

Marks → 05

LO9 → To Determination of heat transfer by force convection,

Content → force convection, turbulent flow, Dittus-Boelter equation, Sieder Tate equation.

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method of Assessment \rightarrow External Practical exam, End semester,

Teaching hr \rightarrow 05

marks \rightarrow 05

Lo-10 \rightarrow To explain the dropwise and film type condensation, Natural and force convection.
Content \rightarrow

Heat Transfer from condensing vapour, Dropwise and film type condensation, Natural convection in laminar flow, Heat Transfer by forced convection in turbulent flow, Dittus Bolter equation, Sieder-tate equation.

Method of Assessment \rightarrow External End semester theory exam.

Teaching hr \rightarrow 05

marks \rightarrow 05

Lo-11 \rightarrow To Drive the Dittus-Bolter equation and Sieder tate equation.
Content \rightarrow

Heat Transfer by forced convection in turbulent flow, Dittus-Bolter equation and Sieder tate equation, laminar flow by Heat Transfer.

Method of Assessment \rightarrow External, End sem. Theory exam.

Teaching hr \rightarrow 05

marks \rightarrow 05

CO-3 → To Know Heat Exchange Equipment and there application in refinery and Petrochemical industry.

LO-12 → To explain the 1-1 shell and Tube Heat exchanger.

content →

Principal, construction, working of 1-1 shell and Tube Heat exchanger, Enthalpy balance Double pipe heat exchanger.

Method of Assessment → Internal, Assignment pen paper test, mid sem test.

Teaching hr: → 05

marks - 10

LO-13 → To explain the 1-2 shell and tube Heat exchanger.

Content →

principle, construction and working of 1-2 shell and tube Heat exchanger, Heat exchangers, tubes, tubes pitch, Shells Baffles Simple design calculation, correction of LMTD for cross flow.

Method of Assessment → External, End sem. theory exam.

Teaching hr → 05

marks - 10

LO-14 → To Determination of overall heat transfer coefficient of 1-2 shell and tube Heat exchangers.

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Content →

principle, construction and working of 1-2 shell and tube Heat exchangers.

Method of Assessment → External, practical exam.

Teaching hr. — 05

marks — 05

LO-15 → To Determination of overall heat

transfer coefficient of double pipe heat exchanger by both counter current and co-current.

Method of Assessment → External, End semester practical exam.

Teaching hr → 05

marks — 05

CO4 → To understanding the radiation and there application in refinery and petrochemical industry.

LO-16 → To explain the radiation, emissive power and concept of black body.

Content →

Nature of thermal radiation, emissive power, absorption, reflection and Transmission, concept of black body.

Method of Assessment → External End semester theory exam.

Teaching hr → 05

marks — 10

Lo-17 → To explain the radiation law and calculate the emissivity.

(8)

Content →

law of black body, Stefan-Boltzmann law, Planck's law, Wien's displacement law, Kirchhoff's law, Radiation from non-black surface, Emissivity, gray body radiation.
Method of Assessment → External, End sem theory exam.

Teaching hr → 05

Marks - 10

Lo-18 → To Determination of emissivity of Non-black surface.

Content → emissivity, Planck's law, Stefan Boltzmann law,

Method of Assessment → Internal, practical lab work, Assignment.

Teaching hr → 05

Marks - 05

Lo-19 → To know evaporation and their application in refinery and petrochemical industry.

Lo-19 → To explain the evaporation process and their principle, construction and working of evaporator.

Content → effect of liquid characteristics on design of an evaporator.

single and multiple effect evaporator, principle construction and working of some important types of evaporator.

Method of Assessment → External, End sem theory exam.

Teaching hr - 05

Marks - 10

LO-20 → To derive the Enthalpy balance for single effect evaporator.

Content → Enthalpy balance for single effect evaporator, performance of tubular evaporator; capacity, economy, boiling point evaluation, and Dühring Rule, enthalpy concentration diagram, single effect calculation, simple problem calculation of area, economy and capacity, methods of feeding to multiple effects evaporator.

Method of Assessment → External End sem theory exam.

Teaching hr → 05

Marks - 10

LO-21 To study of single effect evaporator,

Content → single effect evaporator, enthalpy balance,

Method of Assessment → Internal practical, lab work,

Teaching hr → 05

Marks - 05

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