

Day : Tuesday

Date : 22.05.2018

S-2018-2749

Time : 2.30 P.M. To 5.30 P.M.

Max. Marks : 80

N. B. :

- 1) Q. No. 1 and Q. No. 5 are **COMPULSORY**. Out of remaining attempt **ANY TWO** questions from each section.
- 2) Figures to the right indicate **FULL** marks.
- 3) Answers to both the sections should be written in **SEPARATE** answer books.
- 4) Draw neat and labelled diagram **WHEREVER** necessary.
- 5) Use of non-programmable calculator is **ALLOWED**.
- 6) Assume suitable data, if necessary.

SECTION – I

- Q. 1 Explain the following:
- a) Equation of continuity. (05)
 - b) Fourier's law of heat conduction. (05)
 - c) Friction loss. (04)
- Q. 2 What is velocity profile equation for a laminar flow of Newtonian fluid through a vertical circular tube? Derive the same from shell momentum balance. (13)
- Q. 3
- a) What is the equation of motion? Derive the same and explain its importance. (07)
 - b) How the flow in tubes is affected by friction? Explain the same with derivation. (06)
- Q. 4
- a) How to evaluate the effect of voltage on the temperature rise of electrical heat source? Explain in detail with derivation. (07)
 - b) What is the expression for temperature distribution within composite cylindrical wall? Derive the same. (06)

SECTION – II

- Q. 5
- a) What is the difference between local heat transfer coefficient and mean heat transfer coefficient? (05)
 - b) How mass diffusivity is dependent upon temperature and pressure? (05)
 - c) What is the transport coefficient for high mass transfer rates? Explain. (04)
- Q. 6 What is the heat transfer coefficient for free convection in tubes? Derive correlation for the same. (13)
- Q. 7 How mass diffusivity and mass transfer coefficient is dependent upon temperature and pressure? Derive the correlation and explain. (13)
- Q. 8
- a) What is the correlation between binary mass transfer coefficients in two phases at low mass transfer rates? (06)
 - b) What is the analogy between heat and mass transfer with different dimension less group? (07)