7. a)

$$Re = \frac{\rho V_{avg} D}{\mu}$$

$$= \frac{1650 \times 50 \times 0.06}{0446}$$

$$= 2200$$

Reynolds number ≤ 2300 is a laminar flow in circular pipes

b)

$$Re = \frac{DV}{\nu}$$

$=$

c) $$Re_i = \frac{N_i D_i^2 \rho}{\mu}$$

~~μ — Kinematic viscosity~~ ~~Velocity~~ ~~viscosity~~ ~~of the fluid~~.

ν – Kinematic viscosity of the fluid.

N_i – ~~Viscosity~~ length of pipe.

D_i – Hydraulic diameter.

9 a) Yield stress which essentially thus behaves as a fluid above the yield stress. It also behaves like a solid below a stress level.

b) i) Pseudoplastic
Non-Newtonian - Change when shear rate is increased or reduced.

ii) ~~Thixotropic~~
Newtonian - Does not change with change in shear rate.

c) There will be no change. It is a newtonian liquid.

10
a - Use of Alternate raw materials
- Providing quality water, food and chemicals

b. Feedstock price
Process conditions
Innovation potential.

c) It does not provide the impact of waste used and the nature of the waste as well is not considered.

d)

$$\% \text{ yield} = \frac{\text{actual mass}}{\text{Theoritical mass}}$$