

(Following Paper ID and Roll No. to be filled in your
Answer Books)

Paper ID : 147856

Roll No.

--	--	--	--	--	--	--	--	--	--

B.TECH.

Theory Examination (Semester-VI) 2015-16

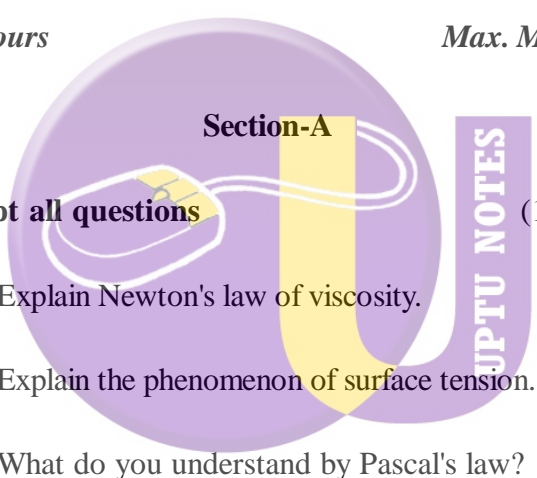
HYDRAULIC & PNEUMATIC SYSTEMS

Time : 3 Hours

Max. Marks : 100

1. Attempt all questions

(10×2 = 20)

- 
- (a) Explain Newton's law of viscosity.
- (b) Explain the phenomenon of surface tension.
- (c) What do you understand by Pascal's law?
- (d) Distinguish between Potential function and stream function.
- (e) Define the Reynold's and Weber's Numbers.
- (f) What are the minor losses in a pipe flow?
- (g) Explain the Boundary Layer concept.

- (h) Explain the phenomenon of laminar sub layer.
- (i) What do you mean by degree of reaction?
- (j) What is the main difference between gear pump and vane pump?

Section-B

2. **Attempt Any Five questions:** [5×10=50]

- (a) Derive an expression for capillary rise and fall when a small diameter tube dipped into liquid.
- (b) Deduce an expression of continuity equation for three dimensional flows.
- (c) The components in a two dimensional flow are $u = 8x^2y - 8/3y^3$, $v = -8xy^2 + 8/3x^3$. Show that these velocity components represent a possible case of an irrotational flow.
- (d) Explain & drive the discharge of an orifice meter for flowing fluid.
- (e) A centrifugal impeller runs at 90rpm and has outlet vane angle of 62° . The velocity of flow is 2.7 m/s throughout and diameter of impeller at exit is twice that the inlet. If the manometric head is 18 m and manometric efficiency is 74%, determine

(2)

P.T.O.

- (i) The diameter of impeller at exit
- (ii) Inlet vane angle.
- (f) A kite weighting 0.40 kgf and having an effective area 0.64 m^2 assumes an angle of 15 degree to the horizontal. The string attached to the kite makes an angle of 45 degree to the horizontal. The pull on the string during a wind of 30 km/hr is 2.5 kgf. Determine the corresponding co-efficients of lift and drag .The density of air is 1.25 kg/m^3 .
- (g) How will you obtain Bernoulli's Equation from Euler equation of motion along a stream line. Write assumptions and application of Bernoulli's equation.
- (h) What do you understand by the separation of boundary layer? What are the different methods of preventing the separation of boundary layers?

Section-C

Note-Attempt Any Two questions: (2×15=30)

3. Explain the characteristics of a centrifugal pump with suitable graphs.
4. The resisting force R of a supersonic plane during flight can be considered as a dependant upon the length of the aircraft L,

Velocity V , Air viscosity μ , air density ρ , and bulk modulus of air k . Express the functional relationship between these variables and resisting force.

5. The plunger diameter and stroke length of a single acting reciprocating pump are 250mm and 420mm respectively. The speed of the pump is 60 rpm. The diameter and length of delivery pipe are 125mm and 50mm respectively. If the pump is equipped with an air vessel on delivery side at the centre line of the pump, find the power saved in overcoming friction in the delivery pipe. Assume coefficient of friction, $f=0.01$.

