www.FirstRanker.com

www.FirstRanker.com

Roll No.	al No. of I	Pages:02
Total No. of Questions : 09		
B.Tech.(Petroleum Refinary Engineering) (2013 Onv	vards)	(Sem.–3)
FLUID FLOW		
Subject Code : BTPC-302		
M.Code:72191		
Time : 3 Hrs.	Max.	Marks : 60

INSTRUCTION TO CANDIDATES :

FirstRanker.com

- 1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
- 2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
- 3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Q.1 Answer briefly :

- (a) What is the difference between specific gravity and mass density?
- (b) What is the unit of force in SI and FPS system?
- (c) Explain the different type of fluid based on rheological diagram.
- (d) Write down the statement of Buckingham II method.
- (e) What is Buoyancy? How to calculate the buoyancy force?
- (f) How to differentiate positive displacement and centrifugal pump?
- (g) Explain Mach number with its significance.
- (h) Explain the concept of path and stream lines.
- (i) What are the major assumptions taken in Navier-Stokes equation?
- (j) How the concept of dimensional analysis helps in scale-up process.

SECTION-B

- Q.2 If the velocity profile of a fluid over a plate is parabolic ($u = ay^2 + by + c$ where a, b, c are constant) with the vertex 20 cm from the plate, where the velocity is 120 cm/sec. Calculate the velocity gradients and shear stresses at a distance of 0, 10, 20 cm from the plate, if the viscosity of the fluid is 8.5 poise.
- Q.3 Explain the concept of Boundary layer theory.

1 M-72191

www.FirstRanker.com

Q.4 Derive the rational equation through Buckingham pi-method for a pipe flow having the following quantities affecting the flow phenomenon-

F the unit boundary friction against which the fluid flows; μ the viscosity; ρ the mass density; V the velocity of flow; D the pipe diameter; *t* the pipe surface roughness.

Q.5 Pressure gauge B is to measure the pressure at point A in a water flow. If the pressure at B is 87 kPa, estimate the pressure at A, in kPa. Assume all fluids are at 20°C. Data: specific weight of water, mercury and oil are 9790, 133100 and 8720 N/m³ respectively.



Q.6 Find the Mach number of a rocket travelling in standard air with a speed of 1600km/h at 15°C.

SECTION-C

Q.7 (a) What is NPSH? How to calculate it?

FirstRanker.com

(b) Derive the expression for Euler equation of motion.

- Q.8 The water is flowing through a pipe having diameters 20 cm and 10 cm at section 1 and section 2 respectively. The rate of flow through pipe is 35 litres/s. The section 1 is 6 m above datum and section 2 is 4 m above datum. If the pressure at section 1 is 39.24 N/cm², find the intensity of pressure at section 2.
- Q.9 A centrifugal pump rotating at 1000 rpm delivers 160 litres/s of water against a head of 30 m. The pump is installed at a place where atmospheric pressure is 1×105 Pa (abs.) and vapour pressure of water is 3 k pa (abs). The head loss in suction pipe is equivalent to 0.2 m of water calculate :
 - (a) Minimum NPSH, and
 - (b) Maximum allowable height of the pump from free surface of water in the sump.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.

2 | M-72191

www.FirstRanker.com