Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III • EXAMINATION – SUMMER • 2014

Subject Code: 130101 **Date: 28-05-2014**

Subject Name: Fluid mechanics

Time: 02.30 pm - 05.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	The efficiency of fan depend upon diameter of rotor, discharge of fluid, density of fluid, dynamic viscosity of fluid and angular velocity of rotor. Find the expression for efficiency in terms of dimensionless number.	**07**
	(b)	A cylindrical block weight 22 KN having diameter 2m and height 2.5m is to float in sea water (S=1.025), show that it does not float vertically.	**07**
Q.2	**(a)**	A water tank 4 km away from a college hostel. Water supplies 150 lit per day per student. The strength of student in hostel is 1000. The total water required is pumped into the tank in night time for 6 hours. Calculate diameter of pipe when head loss is limited to 25m. assume f=0.0018	**07**
	(b)	A 50 mm diameter shaft rotates with 500 rpm in a 80 mm long journal bearing with 51 mm internal diameter. The annular space between the shaft and bearing is filled with lubricating oil of dynamic viscosity 1 poise. Determine the torque required and power absorbed to overcome friction.	**07**
		OR	
	(b)	A pipe line carrying oil of specific gravity 0.9, changes in diameter from 250mm diameter at a position 1 to 450 mm diameter at a position 2 which is 6 meter at a higher level. If the pressure at 1 and 2 are 12 N/cm^2 and 6 N/cm^2 respectively and the discharge is 250 litre/sec. calculate the loss of head and direction of flow.	**07**
Q.3	**(a)**	Write a short note on moody diagram for calculating the head loss due to friction.	**07**
	(b)	What is fluid statics? What are the forces acting on the fluid particle in fluid statics? State Pascal law. Also prove that pressure at same level in static fluids is equal.	**07**
		OR	
Q.3	**(a)**	Derive an equation of sonic velocity through a medium in terms of pressure density.	**07**
	(b)	What is fluid? How fluid is differing from solid? Define viscosity, surface tension, compressibility and vapour pressure.	**07**
Q.4	**(a)**	Define Reynolds's number and give its significant. Explain reynold experiment with neat sketch	**07**
	(b)	Explain euler's, weber and mach model law.	**07**

OR

Q.4	**(a)**	Define circulation and velocity potential function. Explain flow net and state the important of flow net.	**07**
	(b)	Derive euler's equation of motion.	**07**
Q.5	**(a)**	Derive an expression for the discharge through a venturimeter.	**07**
	(b)	A projectile is travelling in air having pressure and temperature as 0.1 N/mm^2 and 0^0c. the mach angle is 38^0. Calculate the velocity of the projectile. Assume R=0.287 Kj/kg k.	**07**

OR

Q.5	**(a)**	Derive an expression for continuity for 3-D flow and reduce it for steady incompressible 2-D flow in Cartesian coordinate system.	**07**
	(b)	Derive equation for total pressure and centre of pressure for vertically immersed surface.	**07**