Code No: RT22034 **R13** SET - 1

II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2017
FLUID MECHANICS AND HYDRALIC MACHINERY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

~~~~~~

PART –A

1.	a)	Differentiate between dynamic viscosity and kinematic viscosity. What are their units of measurement?	(4M)
	b)	Explain path lines, stream lines and streak lines.	(3M)
	c)	What are TEL and HGL? Explain	(4M)
	d)	Bring out the distinction between Bluff and stream lined bodies.	(3M)
	e)	Derive an expression for the force exerted by a jet on moving flat plate.	(3M)
	f)	Explain NPSH in centrifugal pump.	(3M)
	g)	The working head of a water turbine is 400m and its speed is 33.What is the operating head?	(2M)

PART -B

2.	a)	Define the basic law relating to the pressure in a static fluid. What is gauge pressure and atmospheric pressure?	(8M)
	b)	Find the pressure represented by a column of (i)12cm of water (ii)7cm of oil of relative density 0.75.	(8M)
3.	a)	Derive Von Karman momentum integral equation.	(8M)
	b)	Define minor losses in pipes and obtain equation for any four losses.	(8M)
4.	a)	A jet of water having 4cm diameter discharging 42 litres/sec strikes normally on a fixed flat plate. Find the force exerted on the plate.	(10M)
	b)	Explain velocity diagrams	(6M)
5.	a)	Derive the equation of discharge in a single acting reciprocating pump. What is slip, percentage slip and negative slip.	(10M)
	b)	How will you classify the reciprocating pumps?	(6M)
6.	a)	What is a draft tube? Describe its function.	(6M)
	b)	A draft tube has an inlet area of 20 m^2 and outlet area of $82m^2$ .If the inlet velocity is 8.5m/sec and efficiency of the system is 72% and the inlet is 0.50m above the tail race level, find (i) pressure at a draft tube level (ii) Power lost in the draft tube (iii) power lost in the tail race.	(10M)
7.		Write explanatory notes on: (i) characteristic curves of hydraulic turbines (ii) classification in turbines	(16M)
~~~~~~

Code No: RT22034 **R13** SET - 2

II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2017
FLUID MECHANICS AND HYDRALIC MACHINERY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

~~~~~~

PART –A

1. a) Explain Pascal's law (3M)
   b) Describe the use of flow nets (3M)
   c) Discuss minor losses in pipes (3M)
   d) Explain the principles of boundary layer separation. (4M)
   e) Derive an expression for the force exerted by the jet on a stationery vertical plate. (4M)
   f) Explain cavitation in centrifugal pumps. (3M)
   g) Give the name of one radial outward flow type reaction turbine. (2M)

PART –B

2. a) Discuss absolute, gauge, atmospheric and vacuum pressures (8M)
   b) Determine the gauge and absolute pressure at a point which is 4m below the free surface of water. Assume atmospheric pressure as 101.43 KN/m^2 (8M)

3. a) Explain how Reynold's experiment is conducted in the lab and bring its practical uses. (10M)
   b) Explain doublet and vortex flow. (6M)

4. A water jet coming out with a velocity of 17m/sec from the nozzle of 4cm in diameter strikes on a series of plates mounted on a wheel which is moving with a velocity of 6m/sec .Obtain the power developed by the wheel and efficiency of the system. (16M)

5. a) Explain the purpose of the indicator diagram in reciprocating pump. (6M)
   b) A single acting reciprocating pump running at 50 r.p.m delivers 0.01 m^3/sec. the diameter of the piston is 20cm and stroke length is 40cm.Find the (i) coefficient of discharge (ii) slip and percentage of slip of the pump. (10M)

6. a) Bring out the similarities and differences between a pump and a turbine. (4M)
   b) A Hydro Electric power station is equipped with the pelton wheels. The available head is 350m and each jet is supplied with 0.48 m^3/sec of water. The buckets deflect through an angle of 165^0.Find the power produced and the hydraulic efficiency. (12M)

7. Write explanatory notes on (16M)
   (i) Unit and specific quantities of hydraulic turbines
   (ii) Hydraulic Ram
~~~~~~

Code No: RT22034 **R13** SET - 3

II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2017
FLUID MECHANICS AND HYDRALIC MACHINERY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

~~~~~~

PART –A

1. a) Two soap bubbles have diameters d and 2d. In which bubble is the internal pressure higher and why? (3M)
   b) Explain velocity function and potential function. (3M)
   c) Discuss the practical applications of Reynolds experiment (4M)
   d) Explain the development of boundary layer formation over a flat plate (3M)
   e) Derive the expression for a jet striking a curved plate at the centre (4M)
   f) How do you classify centrifugal pumps (3M)
   g) What is the principal drawback of hydraulic turbine (2M)

PART –B

2. a) Explain the differences between manometer and mechanical gauges. What are the different types of mechanical pressure gauges (10M)
   b) A metal ball weighs 9500N in air and 8000N in water. Find out its volume and specific gravity. (6M)

3. a) Define the terms model, prototype and hydraulic similitude (8M)
   b) Explain the objectives of model studies (8M)

4. A jet of water 0.09 m in diameter moving with a velocity 14m/sec strikes a hinged square plate of weight 200N at the centre of the plate which is of uniform thickness. Determine the angle through which the plate will swing. (16M)

5. a) Explain the losses and efficiencies of centrifugal pump. (6M)
   b) Centrifugal pump whose efficiency is 74% is required to handle a liquid of specific gravity 1.2. The quantity of liquid to be pumped is $12m^3$/min against a total head of 17m. Find (i) the pressure developed in kg $/cm^2$. (ii) HP required by the pump. (10M)

6. a) Explain the function of a hydraulic coupling with a neat sketch (4M)
   b) A hydraulic lift is required to lift a load of 10kN through a height of $12m^3$/min once in every 90secs and the speed of the lift is 0.60m/sec. calculate (i) power required to drive the lift. (ii) working period of the lift in sec (iii) idle period of the lift in sec (12M)

7. Write explanatory note on (a) performance curves of centrifugal pumps (b) surge tanks-functions and types (c) pumps in series and parallel (16M)
~~~~~~

Code No: RT22034 **R13** SET - 4

II B. Tech II Semester Regular/Supplementary Examinations, April/May - 2017
FLUID MECHANICS AND HYDRALIC MACHINERY
(Com. to ME, AME)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

~~~~~~

PART –A

1. a) What is meta centre? Explain meta centric height? (3M)
   b) State the equation of continuity for one dimensional flow and explain the terms clearly. (4M)
   c) Explain how to find out the force on a pipe bend. (3M)
   d) Write a list of dimensionless members. How are they obtained? (3M)
   e) Explain three types of similarities which exist between model and prototype. (4M)
   f) What is slip of a reprobating pump? When does negative slip occur? (3M)
   g) Define fluidics. (2M)

PART -B

2. a) Describe with the help of neat sketches different types of manometers. (10M)
   b) The pressure intensity at a point in a fluid is given as 5.310 N/cm^2. Find out the corresponding height of fluid when the fluid is oil of specific gravity 0.9. (6M)

3. a) List out the forces acting in a moving fluid .Explain any four in detail. (8M)
   b) Explain clearly the phenomenon of boundary layer separation and discuss the different methods of prevention of the above. (8M)

4. A jet of water having a velocity of 17cm/sec and making an angle of 45^0 with the horizontal, impinges on a vane moving horizontally with a velocity of 8m/sec. Find out the horizontal pressure on the vanes per kg of water striking per sec. (16M)

5. a) Explain the working of and work done by a centrifugal pump. (6M)
   b) A centrifugal pump whose efficiency is 72% delivers 1500 lits/min through a pipe of 10cm.diameter and 90m long. Find out the pressure required to drive the pump if it lifts water to a height 20m.Assume the coefficient of friction in the pipe to be 0.01. (10M)

6. a) How will you classify turbines? (6M)
   b) A turbine is designed to operate under a head of 30m at 100 rpm with a discharge of 10m^3/sec and 90% efficiency. Calculate the (i) specific speed (ii) Power generated (iii) type of turbine. (10M)

7. a) Explain the terms water hammer and cavitation. (6M)
   b) What is the principle of fluid amplifier? (4M)
   c) Explain various types of amplifiers. (6M)
~~~~~~