

**MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)**(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)  
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad**M. Tech. I SEMESTER SUPPLEMENTARY END EXAMINATIONS, MAY-2019**Subject: Advanced Fluid MechanicsBranch: Thermal Engineering**Time: 3 hours****Max. Marks: 60****PART – A**Answer **ALL** questions of the following**5x4Marks=20 Marks**

1. Define the term circulation and vorticity.
2. Write the expression for Plane Poiseuille flow?
3. Write about the characteristics of turbulent flow. Describe Homogeneous turbulence and isotropic turbulence
4. Define the following:
  - i) Normal shock wave.
  - ii) Fanno line equation.
5. Write about Moody's diagram?

**PART-B**Answer **ALL** questions of the following**5x8 Marks= 40Marks**

1. a) Derive the expression for Euler's equation  
b) Water flows through a pipe AB 1.2 m diameter at 3 m/s and then passes through a pipe BC 1.5 m diameter. At C, the pipe branches. Branch CD is 0.8 m in diameter and carries one-third of the flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.

**OR**

2. a) Derive the impulse-momentum equation.  
b) Oil of specific gravity 0.75 flow through a 15cm diameter pipe under a pressure of 10 N/cm<sup>2</sup>. If the datum is 3m below the centre of the pipe and total energy with respect to the datum is 20 N-m per N, compute the discharge.
3. a) Set up the Navier-Stokes equations and make suitable assumptions to prove that: For a hydraulic mass of fluid, the pressure intensity at a depth 'h' below the free surface is equal to the product of specific weight 'w' and the depth 'h'.  
b) For a two dimensional steady flow, the pressure gradient in the direction of flow ( $dp/dx$ ) is equal to shear gradient ( $d\tau/dy$ ) in the direction normal to the direction of fluid motion

**OR**

4. a) Derive the Hagen-Poiseuille equation and state the assumptions made.  
b) A pipeline 10cm diameter conveys glycerin (density 1260kg/m<sup>3</sup>; dynamic viscosity 15 poise) at a velocity of 5m/s. Make calculations for the maximum shear stress at the pipe wall, head loss in 10m length of pipe and power expended to maintain the flow of glycerin at the prescribed rate.
5. a) How are the thickness of boundary layer, shear stress and the drag force along the flat plate determined by Von Karman momentum equation.  
b) A torpedo which has a surface area of 2.5m<sup>2</sup> and length 1.5m is launched in sea water at a speed of 6.5m/sec. assuming the boundary layer to be fully turbulent, determine the surface drag and the maximum boundary layer thickness. Assume density and viscosity of sea water 1025kg/ m<sup>3</sup> and 0.0156 poise.

**OR**

6. Derive Expression for local and mean drag coefficients for different velocity profiles.

**MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)**(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)  
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad**M. Tech. I SEMESTER SUPPLEMENTARY END EXAMINATIONS, MAY-2019**Subject: **Thermal and Nuclear Power Plants**Branch: **Thermal Engineering****Time: 3 hours****Max. Marks: 60****PART – A**Answer **ALL** questions of the following**5x4Marks=20 Marks**

1. List the advantages and disadvantages of steam power plants.
2. What is mean by combined cycle power plants?
3. How are nuclear reactors classified?
4. Define Capacity factor and load factor.
5. With a sketch write about venturimeter.

**PART-B**Answer **ALL** questions of the following**5x8 Marks= 40Marks**

1. a) Explain in detail the various sources of energy  
b) What are the principle types of power plants? and explain them elaborately.
2. a) With the help of a neat diagram, explain the general layout of steam power plant.  
b) With the help of a line diagram, write the working details of vacuum extraction ash handling system.
3. What is meant by fluidized bed combustion? What are the advantages and limitations of the same.

**OR**

4. With neat sketches explain about combined gas turbine and steam power plants.
5. a) What are the factors to be considered in the economics of nuclear power plants.  
b) Explain the safety measures need to undertake in case of nuclear power plants.
6. a) Differentiate between nuclear fission and fusion reactions.  
b) Explain the essential components of a nuclear reactor with a diagram.
7. a) Write the details of performance characteristics of power plants.  
b) The yearly duration curve of a certain plant is a straight line from 300MW to 80 MW. Power is supplied with one generating unit of 200MW capacity and two units of 100MW capacity each. Calculate the installed capacity, load factor, maximum demand and utilization factor.

**OR**

8. a) What are the various losses while distributing power from power source to consumer?  
b) The following table shows the demand with respect to time

Time(hours)	0-6	6-8	8-12	12-14	14-18	18-20	20-24
Load(MW)	50	60	70	60	80	90	50

Draw the load curve and determine the load factor.

9. With neat sketches explain about bourdon tube type pressure gauge and diaphragm gauge.

**OR**

10. With neat sketches explain about measurement of carbon dioxide and measurement of oxygen