Total No. of Questions : 8]

SEAT No. :

P3854

[Total No. of Pages : 3

[5057] - 2024

S.E. (Mechanical Sandwich) (Semester - I)

FLUID MECHANICS AND MACHINERY

(2015 Pattern)

Time : 3 Hours] *[Max. Marks : 50*

Instructions to the candidates :-

1) ***All questions are compulsory.***
2) ***Answers should be written in same answer books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***
5) ***Your answers will be valued as a whole.***
6) ***Use of log tables, slide rule, Mollier charts, electronic calculator & steam table is allowed.***
7) ***Assume suitable data, if necessary.***

Q1) a) Compare Dynamic Viscosity with kinematic viscosity. **[4]**

b) A Newtonian fluid of kinematic viscosity 2.528 stokes flows over a plate of surface area 0.8 m^2. Velocity at "y" meters from plate is given as $u = 2y - 2y^3$ in m/s. If the shear force on plate is 0.352 N, find specific weight and gravity of the liquid. **[8]**

OR

Q2) a) A triangular plate 1m base & 1.5m altitude is immersed in water. The plane of the plate is inclined at 30° with free surface and the base is parallel to and at 2m depth from water surface. Find total pressure and centre of pressure. **[6]**

b) Distinguish between stream function and velocity potential function. In which cases are both applicable. **[6]**

Q3) a) Mention applications of venturiemeter orifice meter and notch. Compare their accuracies with regards to flow measurements. **[6]**

P.T.O.

b) Fluid of density ρ and viscosity μ flows at an average velocity V through a circular pipe of diameter d. Using Buckingham's theorem show : **[7]**

$$\tau_{wall} = \rho V^2 f\left(\frac{\rho V d}{\mu}\right)$$

OR

Q4) a) A pipe of 60 mm diameter and 450m long slopes upwards at 1 in 50. An oil of 0.9 Ns/m^2 viscosity and 0.9 Sp. gravity is to be pumped at 5 lps flow. **[6]**

i) Is it a laminar flow?

ii) Calculate the pressure gradient over the length of pipe.

b) A twin jet Pelton wheel has mean runner diameter 1.68m and rpm 500. Each jet has 152mm diameter. The net head is 510m. The buckets deflect jet through 165° and relative velocity is reduced by 12% while flowing. Windage losses are 3% of water power. Nozzle coefficient is 0.98. **[7]**

Find :

i) Water power supplied

ii) Brake power

iii) Force on each jet

Q5) a) Compare Francis turbine with Kaplan turbine. **[5]**

b) Derive the equation for Degree of Reaction for a radial turbine. **[8]**

OR

Q6) a) Write four differenciating points between inward and outward flow reaction turbines. Give the examples. **[5]**

b) A Kaplan turbine has a runner diameter 4m & hub diameter 1.2m. Discharge = 7000 LPS. If the mechanical & hydraulic efficincies are 93% & 90% respectively, find the net head & power developed by turbine if there is no whirl at outlet. How much runaway speed would you recommend for this turbine if rpm of turbine is 300? **[8]**

Q7) a) Explain Manometric head and virtual head of a centrifugal pump with formulae. **[4]**

b) A centrifugal pump delivers 1565 LPS at a manometric head of 6.1m while running at 200rpm. The impeller diameter is 1.22m while outer area is 6450 cm^2. If the vanes are set back at 26° at outlet, determine **[8]**

i) Manometric Efficiency

ii) Drive power

iii) Minimum starting speed if diameter ratio is 2.

OR

Q8) A centrifugal pump discharges 3000 lpm of water with outer diameter of impeller as 35 cm. The vanes are set back at 30° to the tangent at the tip. The vanes occupy 10% of peripheral area. The passage is 50mm wide. The impeller speed is 1500 rpm. If manometric efficiency is 82%, find pressure head developed across the impeller in meters of water column. Assume velocity of flow constant through out. **[12]**

Total No. of Questions : 8]

SEAT No. :

P3857

[Total No. of Pages : 3

[5057] - 2045

S.E. (E & TC / Electronics) (Semester - I)

DATA STRUCTURES AND ALGORITHMS

(2015 Pattern)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates :-

1) ***Neat diagrams must be drawn wherever necessary.***
2) ***Figures to the right indicate full marks.***
3) ***Use of non-programmable electronic pocket calculator is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Write a C function with and without pointers to arrays for checking whether the given string is a Palindrome or not. **[6]**

b) Write a C function for the Binary search. Compare the time complexities of Linear, Binary and Fibonacci search. **[6]**

OR

Q2) a) Explain parameter passing by value & by reference with example of swapping of two values. **[6]**

b) Sort the following numbers 75, 15, 58,-5, -22, 34, 54, 28, 27, 1 using :**[6]**

i) Bubble Sort

ii) Merge sort

Q3) a) Identify the expressions and convert them into remaining two forms:

i) AB +C*DE–FG++$

ii) –A/B*C$DE

Note: $ = Exponent operator **[7]**

b) Define queue. What are conditions for queue empty and queue full when queue is implemented using Array? Explain. **[6]**

P.T.O.

OR

Q4) a) Write a function PUSH and POP in 'C' for stack using Linked List. **[7]**

b) A doubly linked list with numbers to be created. Write node structure and algorithm to create the list. **[6]**

Q5) a) Construct the Binary Search Tree (BST) from following elements : **[6]**

5,2,8,4,1,9,7

Also show preorder, inorder and postorder traversal for the same.

b) Explain with suitable example how Binary Tree can be represented using: **[6]**

i) Array

ii) Linked List

OR

Q6) a) Construct Binary Search Tree(BST) for the following: **[6]**

MAR, MAY, NOV, AUG,APR, JAN, DEC, JUL,FEB,JUN, OCT, SEPT

b) Write a Recursive 'C' function for Preorder and Postorder traversal of a Binary Search Tree. **[6]**

Q7) a) What do you mean by adjacency matrix and adjacency list? Give the Adjacency matrix and Adjacency list as shown in Figure (1) . **[7]**

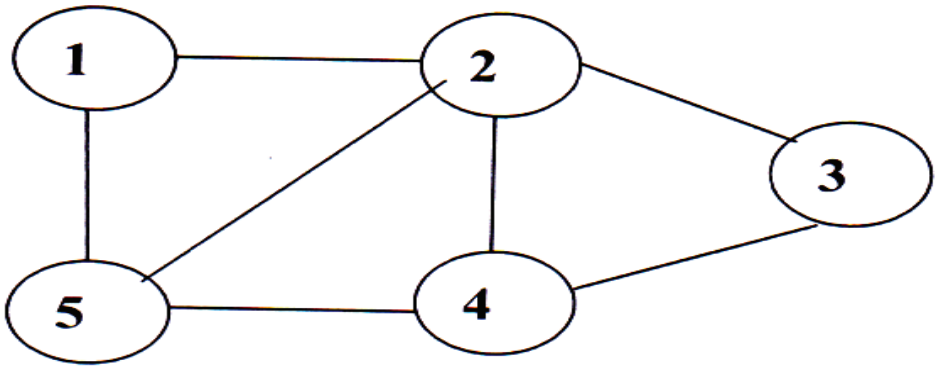

Figure (1)

b) Define DFS and BFS graph with example. **[6]**

OR

Q8) a) Find out the Minimum Spanning Tree of the following graph Figure(2) using : **[7]**

i) Prim's Algorithm

ii) Kruskal's Algorithm

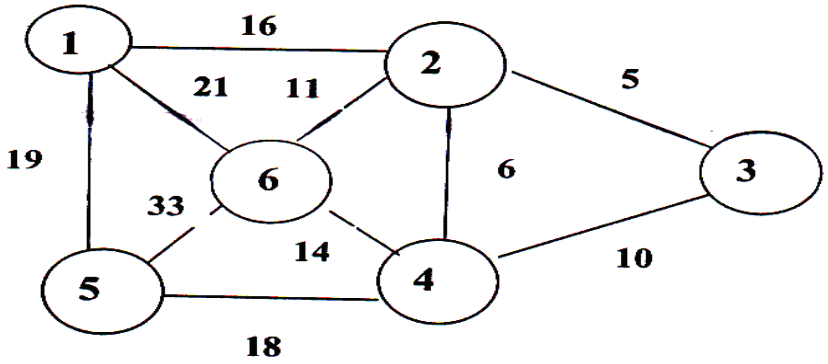

Figure (2)

b) Explain Dijkstar's Algorithm with example. **[6]**

Total No. of Questions : 8]

SEAT No. : ____

P3858

[Total No. of Pages : 3

[5057] - 2083

S.E. (Chemical) (Semester - I)

FLUID MECHANICS

(2015 Pattern)

Time : 2 Hours] ***[Max. Marks : 50***

Instructions to the candidates :-

1) ***All questions are compulsory.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of programmable calculator is not allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) The velocity distribution for flow over a flat plate is given by: **[8]**

$$u = 1.5y - y^2$$

Where u is the point velocity in meter per second at a distance y meter above the plate. Determine the velocity gradient and shear stress at y = 5 and y = 10 cm. Assume dynamic viscosity as 10 poise.

b) Discuss the followings: **[4]**

i) Stream line and stream tube

ii) Path line and streak line

OR

Q2) a) A differential mercury manometer is used to measure the pressure difference between two pipes at A and B containing liquids of specific gravity 0.8 and 0.7 respectively. Center to center distance between pipes A and B is 50 cm, A being above B. The mercury level in the leg of manometer connected to pipe A is 0.3 m below its center while that in the leg connected to pipe B is 0.6 m below its center. Find the differential pressure between pipes A and B in terms of water column. **[6]**

b) Find pressure due to 0.5 m of: **[6]**

i) Water

ii) Oil of specific gravity 0.8

iii) Mercury of density 13.6 g/cc

P.T.O.

Q3) a) Draw a neat sketch and explain the working of the venturimeter. Derive an equation to calculate the flow rate by using the venturimeter. **[7]**

b) An orificemeter with orifice diameter 20 cm is inserted in a pipe of 40 cm diameter. The pressure gauges fitted on upstream and downstream of the orifice gives the readings of 25 N/cm^2 and 10 N/cm^2 respectively. Find the rate of flow of water in the pipe. **[6]**

(Take $C_D = 0.6$)

OR

Q4) a) For laminar flow through circular pipe show that the kinetic energy correction factor $\alpha = 2$. **[7]**

b) Water is flowing through a pipe having diameter of 300 mm and 200 mm at the bottom and upper end respectively. The pressure at the bottom is 26 N/cm^2 and the pressure at the upper end is 10 N/cm^2. Determine the difference in datum head if the rate of flow through the pipe is 40 1/s. Assume the upward flow in the pipe. **[6]**

Q5) a) The resistance R experienced by a partially submerged body depends upon the velocity **v**. length of the body **l**, viscosity of the fluid μ density of the fluid ρ, and acceleration due to gravity **g**. Establish a suitable relation involving dimensionless groups usingthe Buckingham's method of dimensional analysis. **[7]**

b) With suitable example, describe in detail the Reyleigh's method of dimensional analysis. **[6]**

OR

Q6) a) Pressure drop of a homogeneous fluid in a straight smooth pipe (ΔP) is a function of the pipe geometry (diameter d, and length l), the physical properties of the fluid (density ρ and viscosity μ) as well as its velocity v. **[7]**

$\Delta P = f(d, l, \rho, \mu, v)$

b) Define and explain : **[6]**

i) Geometric similarity

ii) Kinematic similarity

iii) Dynamic similarity

Q7) a) Calculate the momentum thickness for the following boundary layer velocity profile: **[6]**

$$\frac{u}{u_\infty}=\frac{3}{2}\left(\frac{y}{\delta}\right)-\frac{1}{2}\left(\frac{y}{\delta}\right)^3$$

b) Discuss the classification of the fluidization & describe the particulate and aggregative fluidization. **[6]**

OR

Q8) a) A thin plate is moving in still atmospheric air at a velocity of 4 m/sec. The length of the plate is 0.8 m and width 0.6 m. Calculate : **[6]**

i) The thickness of the boundary layer at the end of the plate and

ii) Drag force on one side of the plate.

Take density of air as 1.20 kg/m^3 and kinematic viscosity 0.15 stokes.

b) Define and explain : **[6]**

i) Displacement thickness

ii) Momentum thickness

iii) Energy thickness