

Reg. No. _____

Karunya University

(Karunya Institute of Technology and Sciences)

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

Model Question Paper

Subject Title: FLUID MECHANICS AND MACHINERY

Subject Code: 12CE263

Time: 3 hours

Maximum Marks: 100

PART A (10 X 1 = 10 MARKS)

1. The ratio between the weight of a fluid to its volume is called _____.
2. Define viscosity.
3. What is a steady flow\?
4. Define vortex flow.
5. Define coefficient of discharge.
6. What is water hammering?
7. Name the main parts of a centrifugal pump.
8. Define slip.
9. What do you mean by gross head of a turbine?
10. Define flow ratio.

PART B (5 X 3 = 15 MARKS)

11. Name the different forces present in a fluid flow. For the Euler's equation of motion, which all forces are taken into consideration?
12. What is a manometer? How are they classified?
13. What is a syphon? On what principle it works?
14. What is priming? Why is it necessary?
15. What is cavitation? How can it be avoided in reaction turbine?

PART C (5 X 15 = 75 MARKS)

16. An oil of Kinematic Viscosity 0.5 stoke is flowing through a pipe of diameter 300 mm at the rate of 320 liters per second. Find the head lost due to friction for a length of 60 m of the pipe.

OR

17. If for a two dimensional potential flow, the velocity potential is given by $\phi = x(2y - 1)$, determine the velocity at the point P (4, 5). Determine also the value of stream function at point P.
18. Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the center of plate is 2m below the free surface of water. Find the position of center of pressure also.

OR

19. A pipe, through which water is flowing is having diameters 40 cm and 20 cm at cross sections 1 and 2 respectively. The velocity of water at section 1 is given 5.0 m/s. find the velocity head at the sections 1 and 2 and also rate of discharge.

20. A right angled V- notch is used for measuring a discharge of 30 liters/s. An error of 2 mm was made in measuring the head over the notch. Calculate the percentage error in the discharge. Take $C_d = 0.60$.

OR

21. A pipe contains an oil of specific gravity 0.8. A differential manometer connected at the two points A and B of the pipe shows a difference in mercury level as 20 cm. Find the difference of pressure at the two points.
22. Find the number of pumps required to take water from a deep well under a total head of 156 m. Also the pumps are identical and are running at 1000 rpm. The specific speed of each pump is given as 20 while the rated capacity of each pump is 150 liters/s.

OR

23. A double acting reciprocating pump, running at 50 rpm is discharging 900 liters of water per minute. The pump has a stroke of 400 mm. the diameter of piston is 250 mm. The delivery and suction heads are 25 m and 4 m respectively. Find the slip of the pump and power required to drive the pump.
24. Design a pelton wheel for a head of 80 m and speed 300 rpm. The pelton wheel develops 103 kW shaft power. Take $C_v = 0.98$, speed ratio = 0.45 and overall efficiency = 0.80.

OR

25. A Kaplan turbine working under a head of 29 m develops 1287.5 kW shaft power. If the speed ratio is equal to 2.1, flow ratio = 0.62, diameter of boss = 0.34 times the diameter of the runner and overall efficiency of the turbine = 89 %, find the diameter of the runner and speed of turbine.