

SE Civil - IV C-scheme

40+40+32
19.5.23

122

Time: 3 Hrs

Marks: 80

- N.B. 1) Question No.1 is Compulsory.
 2) Attempt any Three questions from remaining questions.
 3) Assume suitable data where required and clearly state the same.
 4) Figures to the right indicate full marks.

Q.NO. 1 Attempt any four

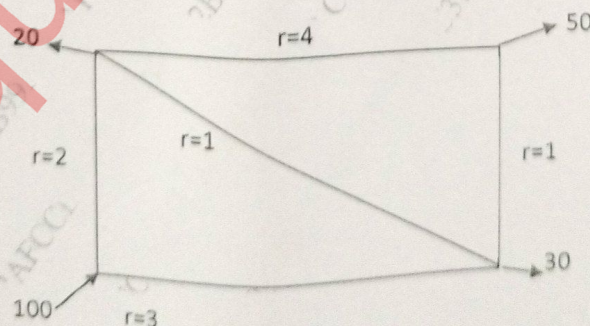
(20)

- Explain the term co-efficient of friction on what factors does this coefficient depend?
- Derive the expression for diameter of nozzle for maximum transmission of power through nozzle.
- write a short note on laminar flow.
- obtain an expression for velocity distribution for turbulent flow in smooth pipes.
- Define energy thickness? derive its equation
- Explain Froude's model law

Q.NO. 2 a) A siphon of diameter 200 mm connects two reservoirs having difference of (10) elevation of 16 m. The total length of siphon is 600 mm and the summit is 5 m above the water level in the upper reservoir, if separation takes place at a 2.8 m of water absolute. Find maximum length of siphon from upper reservoir to summit. take friction factor = 0.004 atmospheric pressure is 10.3 m of water.

- 300 mm diameter Horizontal pipe is suddenly enlarged to 600 mm. the rate of flow of (10) water through pipe is 130 KN/m². determine i) loss if head due to sudden enlargement
- Intensity of pressure in larger pipe. iii) power lost due to enlargement.

Q.NO. 3 a) calculate the discharge in each pipe of the network shown in fig below by (10) Hardy cross method.



SE Civil - IV C-scheme 19.5.22

12

b) Two parallel plates kept 200 mm apart have laminar flow of oil between them with a maximum velocity of 1.6 m/s calculate i) the discharges per meter width ii) the shear stress at plates iii) the difference in pressure between two points 20 m iv) the velocity gradient at the plate v) the velocity 20mm from the plate. Assume viscosity of oil to be 24.5 poise. (10)

Q.NO. 4 a) i) Explain hydrodynamically rough and smooth boundary. (5)
ii) Explain boundary layer separation and its control. (5)

b) Experiment were conducted in a wind tunnel with a wind speed of 56 km /hr on a flat plate of size 2 m long and 1 m wide. the density of air is 1.20 kg/m³. the coefficient of lift and drag 0.75 and 0.15 respectively determine i) lift force ii) drag force iii) resultant force iv) direction of resultant force. (10)

Q.NO. 5 a) i) Explain magnus effect in detail. (5)
ii) Write a short note on "Moment of Momentum principle. (5)

b) A 20 cm diameter pipe carries water under a head of 12 m with velocity of 3 m/s. if the axis of the pipeline turns through 45°, find the magnitude and direction of resultant force at the bend (10)

Q.NO. 6 a) The force f on the propeller of an aircraft is known to depend upon speed of the aircraft V , air density ρ , air viscosity μ , propeller diameter D , speed of rotation of propeller N . Derive an expression for force F . (10)

b) A spillway model is to be made to a scale of 1/25 across a flume which is 0.5 m wide. The prototype is 15 m high and the maximum head expected is 2 m. (10)

- i) What height of model and what head on model should be used
- ii) If the flow over the model at 6 cm head is 0.02 m³/s, what flow per metre length of prototype may be expected.
