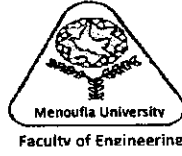


المقرر: النمذجة الهيدروليكية كود (CVE644)
الفرقة: دراسات عليا مستوى ٦٠٠
زمن الامتحان: ثلاث ساعات
درجة الامتحان (١٠٠ درجة)



جامعة المنوفية
كلية الهندسة شبين الكوم
قسم الهندسة المدنية

(2020-2019)

Answer the following questions:

Question 1: (25marks)

- What is the meaning of hydraulic modeling? And what are its applications?
- What are the benefits of the hydraulic engineer's models?
- What is the difference between the model and the prototype?
- The resisting force (F) of a supersonic plane during flight can be considered as dependent upon the length of aircraft (L), velocity (V), air viscosity (μ), air density (ρ) and bulk modulus of air (K), express the functional relationship between these variables and resisting force.

Question 2: (25marks)

- What is the difference between numeric modeling and physical modeling?
- What are the basic principles to say that the physical model is similar to those in the prototype?
- What are the mathematical software packages that are used in the Numerical modeling techniques?
- Show by the use of Buckingham's π -theorem that the velocity through circular orifice is given by: $V = \sqrt{2gH} f\left(\frac{D}{H}, \frac{\mu}{\rho V H}\right)$ where H is the head causing flow, D diameter of the orifice, μ the coefficient of viscosity, ρ the mass density and g is the gravitational acceleration. (take V, H and ρ as repeating variables)

Question 3: (25marks)

- True or false?

1-Geometric similarity is enough to ensure that flow patterns are similar in both model and prototype.

2- The physical model is usually bigger than the prototype.

3- In the open channel flow the Reynold number is more important than the Froude number.

b- What are the required steps to design a hydraulic model?

c- What are the basic scale ratios for the hydraulic modelling?

d- The efficiency (η) of a fan depends upon density (ρ), dynamic viscosity (μ) of the fluid, angular velocity (ω), diameter (D) of rotor and discharge (Q) of fluid, explain η in terms of dimensionless parameter.

Question 4: (25marks)

a- Define (Geometric similarity- Kinematic similarity- Dynamic similarity)?

b- What are the subsequent scale ratios for the hydraulic modelling?

c- Define the distorted models?

d- A model aeroplane is built at 1/10 scale and is to be tested in a wind tunnel operating at a pressure of 20 times atmospheric. The aeroplane will fly at 500km/h. At what speed should the wind tunnel operate to give dynamic similarity between the model and prototype? If the drag measure on the model is 337.5 N what will be the drag on the plane?

مع اطيب التمنيات بالنجاح د.م. اشرف فتحي النلين

هذا الامتحان يساهم في الوصول للمهارات المطلوبة في البرنامج العلمي طبقا للمعايير (NARS)								رقم السؤال
(4-c)	(4-b)	(2-c)	(1-a)	(2-b)(3-a)	(1-c)(4-a)	(2-a)(3-b)	(1-b)(3-c)	
C7	C5	B7	B2	B1	A5	A3	A2	المهارات
المهارات الاحترافية		المهارات الفكرية			مهارات التذكر و الفهم			