Assignment 09: Dimensional Analysis and Law of Similarity

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Module 9: Dimensional Analysis and Law of Similarity

Assignment 9

Important notes:
- (i) All questions are mandatory
- (ii) No negative marking for the wrong answer
- (iii) All questions have only one correct answer

1) Force ($F$) is the
   - Primary fundamental unit
   - Auxiliary fundamental unit
   - Convenient fundamental unit
   - None of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - Convenient fundamental unit

2) The dimension of surface tension is
   - $MT^{-2}$
   - $ML^{-1}T^{-1}$
   - $ML^{-1}T^{-2}$
   - $ML^{-2}$

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - $MT^{-2}$

3) Rayleigh's method of dimensional analysis determine only the
   - Exact relationship between the parameters
   - Relevant independent dimensionless parameters
   - Both (a) and (b)
   - None of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - Relevant independent dimensionless parameters

4) In case of dimensional analysis one should not choose fluid property as the repeating variables
   - Density
   - Viscosity
   - Surface tension
   - None of the above

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - Density

5) The drag $D$ of a sphere is influenced by
   - Sphere diameter and flow velocity

   No, the answer is incorrect.
   Score: 0
   Accepted Answers:
   - Sphere diameter and flow velocity
6) Hydraulic similitude is the
   1 point
   a) Similarity between the prototype and its scale model
   b) Dissimilarity between the prototype and its scale model
   c) Both (a) and (b)
   d) None of the above

   No, the answer is incorrect.
   Score: 0

   Accepted Answers:
   Similarity between the prototype and its scale model

7) A model is said to be completely similar and true model with the real application if the model satisfies
   1 point
   a) Geometric similarity
   b) Kinematic similarity
   c) Dynamic similarity
   d) All the above

   No, the answer is incorrect.
   Score: 0

   Accepted Answers:
   All the above

8) In case of geometric similarity the model and prototype should have
   1 point
   a) The same shape but different in size
   b) The same ratio of all corresponding lengths but different in included angles
   c) Both (a) and (b)
   d) None of the above

   No, the answer is incorrect.
   Score: 0

   Accepted Answers:
   The same shape but different in size

9) Kinematic similarity is the
   1 point
   a) Similarity in shape
   b) Similarity of motion
   c) Similarity of forces
   d) All the above

   No, the answer is incorrect.
   Score: 0

   Accepted Answers:
   Similarity of motion

10) If \( \text{Re} = \frac{\text{inertial force}}{\text{viscous force}} \) is same in both the model and prototype systems, then it can be classified as
    1 point
    a) Geometric similarity
    b) Kinematic similarity
    c) Dynamic similarity
    d) All the above

    No, the answer is incorrect.
    Score: 0

    Accepted Answers:
    Dynamic similarity

11) In case of supersonic flow, the value of Mach number (\( M \)) is
    1 point
    a) \( M > 1 \)
    b) \( M = 1 \)
    c) \( M < 1 \)
    d) \( M = 0 \)

    No, the answer is incorrect.
    Score: 0

    Accepted Answers:
    \( M > 1 \)

12) The Froude number (\( Fr \)) is the
    1 point
    a) Ratio of inertia force to the viscous force
    b) Ratio of inertia force to the gravity force
    c) Ratio of inertia force to the surface tension force
    d) None of the above

    No, the answer is incorrect.
    Score: 0

    Accepted Answers:
    Ratio of inertia force to the gravity force

13) Mach number is
    1 point
    a) Inversely proportional to velocity
14) Does not depend upon velocity
   - Directly proportional to velocity
   - None of these
   No, the answer is incorrect.
   Accepted Answers:
   - Directly proportional to velocity

14) The study of predicting prototype conditions from model observations is known as
   - Similitude
   - Geometrical similarity
   - Prototype
   - Model
   No, the answer is incorrect.
   Accepted Answers:
   - Similitude

15) What is the dimension of thermal conductivity:
   - $ML^{-3}T^{-1}q^{-1}$
   - $ML^{-1}T^{-1}q^{-1}$
   - $ML^{-3}T^{-1}q^{-1}$
   - $ML^{-2}T^{-1}q^{-1}$
   No, the answer is incorrect.
   Accepted Answers:
   - $ML^{-1}T^{-1}q^{-1}$