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JAYA GROUP OF INSTITUTIONS-THIRUNINRAVUR
4th SEM – B.E. / B.Tech
INTERNAL ASSESSMENT-1(MODEL EXAM-1)

Sub. Name: AERODYNAMICS-I
Sub. Code: AE 6401
Duration: 180 minutes

Date: 28-01-2015
Branch: Aeronautical
Max.Marks: 100

PART-A

10X2= 10

1. Define Aerodynamics
2. Write any two objectives of aerodynamics
3. What do you understand by rolling moment and yawing moment
4. What is law of conservation of momentum?
5. Define stream function and stream-line
6. Write the Superposition theorem.
7. Compare between Steady flow and Uniform Flow
8. What is known as flux of a flow?
9. What are the properties of Uniform source flow?
10. What is D'Alembert's Paradox?

PART-B

5X16= 80

11. (a) Derive the continuity equation in Cartesian coordinates

OR

- 11 (b) Derive the Bernoulli's energy equation

- 12 (a) Derive the expression for continuity equation in polar coordinates

OR

- 12 (b) Prove that $P=k\rho^{\gamma}$ and also prove that stream lines and potential lines are mutually perpendicular to each other.

- 13 (a) Derive the momentum equation for a 3 dimensional flow

OR

- 13 (b) Prove that the stream lines of a source and sink pair are circular arcs.

(4)

(54)

14 (a) Prove that stream lines are asymptotes for the velocity components given as $u = x$ & $v = -y$

OR

14 (b) Derive the expression for stream function and potential functions of Doublet and also draw the pattern of stream lines and potential lines.

15 (a) What will be resulted when an uniform flow is superimposed on a Doublet of strength ' Λ '

OR

15 (b) (i) Two discs are placed on a horizontal plane as one over the other. Water enters the centre of the lower disc and flows radially outwards from the source of strength $0.8 \text{ m}^2/\text{s}$. The pressure at the 100mm disc is 400KPa. Find out (i) Pressure at 200mm disc and (ii) The stream functions at 30° and 60° . (ii) Calculate and Draw the pressure distribution over a circular cylinder without circulation.

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