Roll No. ☐☐☐☐☐☐☐☐☐☐☐☐☐   **Total No. of Pages : 02**

Total No. of Questions : 09

B.Tech.(Aerospace Engg.) (EL-2012 Batch)   (Sem.–7, 8)
APPLIED GAS DYNAMICS
Subject Code : ASPE-410
M.Code : 72573

Time : 3 Hrs.   **Max. Marks : 60**

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. **Answer briefly :**

   (a) What do you understand 'shock induced flow separation'?

   (b) Distinguish between weak and strong oblique shocks.

   (c) Distinguish between attached and detached shocks.

   (d) Distinguish between compression and expansion wave.

   (e) Explain the phenomenon of choking briefly.

   (f) What do you mean by 'Mach reflection'?

   (g) Define Fanno flow.

   (h) What do you mean by similarity rules?

   (i) Define Drag divergence with the help of a sketch.

   (j) What do you mean by hodograph plane?

SECTION-B

2. Write a note on 'wind tunnel instrumentation'.

3. What do you mean by shock polar? Draw dimensionless shock polar.

4. Define Prandtl-Glauert Rule for subsonic flow. Calculate lift curve slope of a profile at $M_\infty = 0.29$ using P-G rule for the following given data :

    $C_L = 0.2$ at $\alpha = 3°$ and $C_L = -0.1$ at $\alpha = -2°$.

5. Explain salient characteristics of θ- β-M relation.

6. What is De Laval nozzle? Distinguish between over-expanded and under-expanded conditions in De Laval nozzle.

SECTION-C

7. Linearize the basic 3D potential equation for compressible flow using small perturbation theory.

8. List and explain various types of high speed wind tunnels with the help of sketches.

9. Write notes on following :

    a) Optical methods of flow visualization

    b) Rayleigh flow with the help of sketch

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.