

## LEVEL FOUR – AVIATION SUBJECTS COMBINED ASSESSMENT STUDY GUIDE

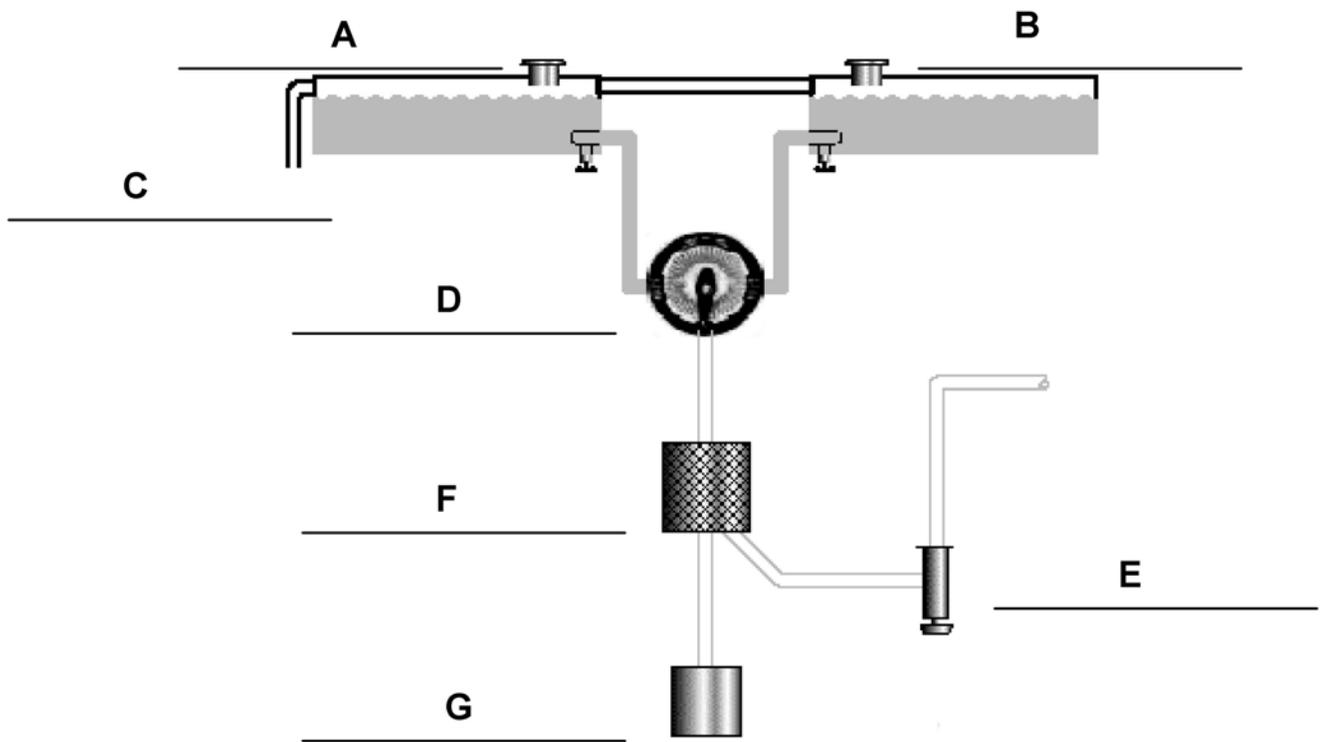
*The exam consists of 43 multiple choice questions plus one of the two attached diagrams. Each cadet is allotted 60 minutes to complete the exam.*

1. Auxiliary airfoils that move out in front of the leading edge at high angles of attack are called **slats**.
2. Passages built into the wing that affect the airflow in the same way as slats are called **slots**.
3. Wing tip modifications designed to increase lift and reduce drag include **wing tip fuel tanks, winglets, and drooping the wing tips**.
4. Wash-in **increases** the angle of incidence at the wing tip.
5. Camber is the **curvature of an airfoil**.
6. Divide the **wing span** by the **average chord** to calculate the aspect ratio.
7. Laminar airfoils are generally the thickest at **50%** of the chord, whereas conventional airfoils are thickest at **25%** of the chord, and reduce drag by maintaining the laminar flow of air throughout a **greater percentage** of the chord.
8. A **decrease in the density of the air** as the altitude of an aircraft increases can cause **density errors in the ASI**
9. The **ASI** is connected to both the pitot pressure source and the static pressure port. **All other instruments are only connected to the static port.**
10. **VSI** measures the rate of change of the static pressure and **indicates if the altitude is increasing or decreasing**
11. Pitot pressure is affected by both turbulence and motion.
12. \*Precession is the tendency of a rotating body, when a force is applied perpendicular to its plane of rotation, to turn in the direction of its rotation 90 degrees to its axis and take up a new plane of rotation parallel to the force applied.\*
13. **Density altitude** is the pressure altitude **corrected for temperature**.
14. When flying into an area with a relatively **higher pressure, the altimeter will read lower** than the actual altitude if the altimeter setting is not corrected. (*From high to low, watch out below. From low to high, look for the sky*)
15. The **boundary layer** is the thin section of **air closest to the wing**
16. Pushing the throttle away from you (**forwards movement**) of the throttle **opens** the throttle valve, which **increases** the fuel/air mixture, and **increases** the power being produced by the engine
17. Properties of the engine oil are measured by the **oil pressure and oil temperature gauges**.
18. The distance a propeller travels forward in one revolution is known as **pitch**.
19. **Thrust** is maintained throughout most of the diameter of the propeller by means of the **variation in airfoil sections and the angle of attack**.
20. **Power decreases** in the engine as the altitude increases and the air becomes less dense
21. When the engine is not running the manifold pressure gauge will register **atmospheric pressure**.
22. **Red, yellow, and green** arcs are found on the **tachometer**.

23. **Surface friction** causes lower wind speeds than would be expected from the pressure gradient.
24. The three main **factors** that determine the weather in an **air mass** are the moisture content, the stability of the air, and the cooling process.
25. In *stable air, stratus clouds and poor visibility* are common, whereas....
26. In unstable air, cumulus cloud and good visibility are common.
27. A **gust** is a rapid and irregular change of wind speed.
28. An **anabatic wind** is the term for **up-slope winds** flowing from valleys to high elevations above, whereas....
29. **Down-slope winds** flowing from high elevations down the slopes to valleys below are known as **katabatic winds**.
30. Air speed errors are as follows: IAS corrected for Position → **CAS corrected for Compressibility** → **EAS corrected for Density** → **TAS**
31. **Mach Speed** = 
$$\frac{\text{airspeed}}{\text{speed of sound}}$$
32. An **air mass** is a large section of the troposphere with **uniform properties of temperature and moisture in the horizontal.**
33. **Parallels of latitude** are circles on the Earth's surface that lie parallel to the equator. They are measured from 0-90 degrees north and south of the equator, in degrees, minutes, and seconds.
34. Meridians of longitude are **semi-great circles** that join the geographic poles of the Earth.
35. The advantage of a **great circle** route is that it is the **shortest distance between two points** on the surface of the Earth.
36. The advantage of a **rhumb line** route is that it has a **constant direction** (same heading for the entire route).
37. On east and west headings, deceleration causes the compass to register a turn towards the south (*ANDS: Accelerate/North, Decelerate/South*).
38. Compass heading is the magnetic heading with the deviation. West deviation is **added** while east deviation is **subtracted** (*West is Best, East is Least*)
39. **Variation** is the angle between true heading and magnetic heading.
40. Lines drawn on a chart joining places having the same variation are **isogonic lines**.
41. Lines joining places of zero magnetic deviation are **agonic lines**.
42. The fuel selector valve **selects** or **shuts off** different fuel tanks
43. A **cold** air mass is more dense and therefore **sinks**, undercutting a **warm** air mass which will **rise**

**Part B—Diagrams (7 points)**

1. Label the following parts on the diagram below.
  - a. Left tank
  - b. Right tank
  - c. Vent
  - d. Selector valve
  - e. Primer
  - f. Strainer
  - g. Carburetor



**Part B—Matching (5 points)**

1. Label the following parts on the propeller diagram below.

- a. Thrust
- b. Relative airflow
- c. Resultant
- d. Axis of rotation
- e. Torque force

