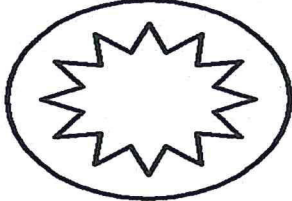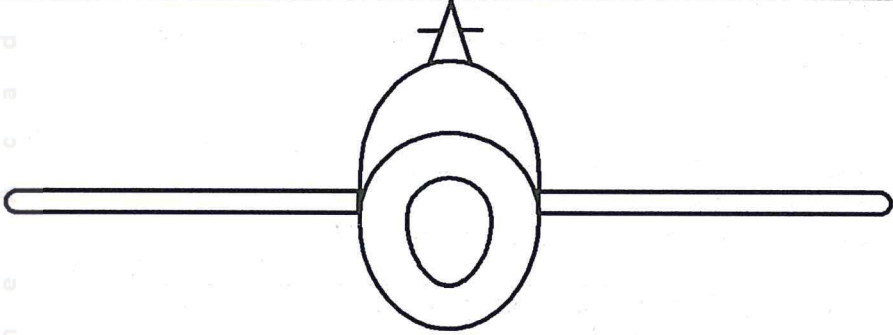## 4.22 AVIATION TECHNOLOGY (450)

4.22.1 Aviation Technology Paper 1 (450/1)

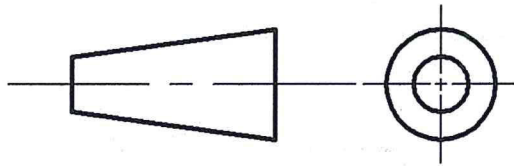**SECTION A**

1.		(i) To assist in the safe and efficient conduct of the flight. (ii) Take charge of the aircraft if the captain is unable. (iii) Assist in the safe navigation of the flight. (3 x 1) =3marks	**(3 marks)**	
2.	(a)	(i) To help passengers and crew to float in case of a crash on water. (ii) To assist in breaking out of the aircraft in case of a crash for quick evacuation. (2 x 1) =2marks	**(2 marks)**	

	(b)	(i) - Choose the right file for the material to be cut.
		   - Ensure the handle is fixed firmly.
		   - Keep the file clean by use of a file card or wire brush.
		 (Any 2 x ½) =1mark
			(1 mark)	

		(ii) - Use the taps in their order; tapes, intermediate, plug or bottoming.
		   - The tap must be positioned vertically to the work piece.
		   - Avoid use of excessive force.
		   - Use cutting fluid.
		 (Any 2 x ½) = 1 mark
			(1 mark)	

3.	(a)	(i) Cumulonimbus (ii) Nimbo Stratus (2 x ½) = 1 mark	**(1 mark)**	
	(b)	(i) This is a designated area where aircraft compass is tested. (ii) It is an area used to test run engine. (2 x 1)=2 mark	**(2 mark)**	
4.	(a)		**(1 mark)**	

Spring washer   (1 mark)

Shake proof washer   (1 mark)   **(1mark)**

4 (b)	(i) Corrosion resistant (ii) Malleable and ductile (iii)Good conductor of electricity (iv)Strong and light (4 x ½ =2marks)		(2 marks)
5 (a)	(i) **Indicated Speed:** Airspeed of the aircraft indicated on the airspeed indicator. (ii) **Mach Number:** Speed of the aircraft in relation to the speed of sound. (iii) **Viscosity:** The resistance to flow in fluids. (3 x 1=3marks)		(3 marks)
(b)	 MID WING (1 mark) Straight wing fitted in the middle of fuselage (1 mark) DIHEDRAL WING (1 mark) Wing fitted to the fuselage inclined at an upward angle (1 mark)		(1 mark) (1 mark) (1 mark) (1 mark)
6. (a)	(i) Partition the fuselage (ii) Contain pressure (Pressure bulkheads) (iii) Fire wall (fire bulkhead) separate heat areas.	(3 x 1) =3marks	(3 marks)
(b)	Used to aid visual inspections particularly in hidden areas.	(1x1) = 1mark	(1 mark)

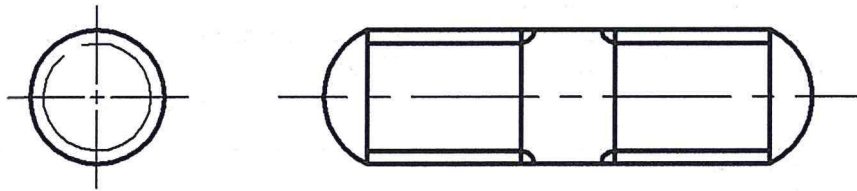|			
7. (a)	 Sketch – **1 mark** Correct labelling **6 x ½= 3 marks**		**(4 marks)**
(b)	(i) There must be an equal but opposite reaction. (ii) The mass of air is given an acceleration through the exhaust and this reaction pushes the aircraft in the opposite direction. (Thrust) **(2 x 1= 2 marks)**		**(2 marks)**
8. (a)	(i) Manual – mechanical operated (ii) Powered – hydraulic operated (iii) Fly by wire – Electrically operated **(3 x 1 = 3 marks)**		**(3 marks)**
(b)	(i) Altitude indicator (ii) Vertical Speed Indicator (VSI) **(2 x ½= 1 mark)**		**(1 mark)**
9.	Tapping procedure (i) Drill hole to correct size. (ii) Enter tap perpendicular to the work piece and turn in cutting direction. (iii)Test the tap for squareness. (iv)Continue turning in cutting direction for half a turn then reverse for quarter a turn. (v) Change the second tap then plug tap (bottoming) (vi)Lubricate the work as you continue to cut. **(6 x 1 = 6 marks)**		**(6 marks)**

10.

(a)

(a)   First angle projection
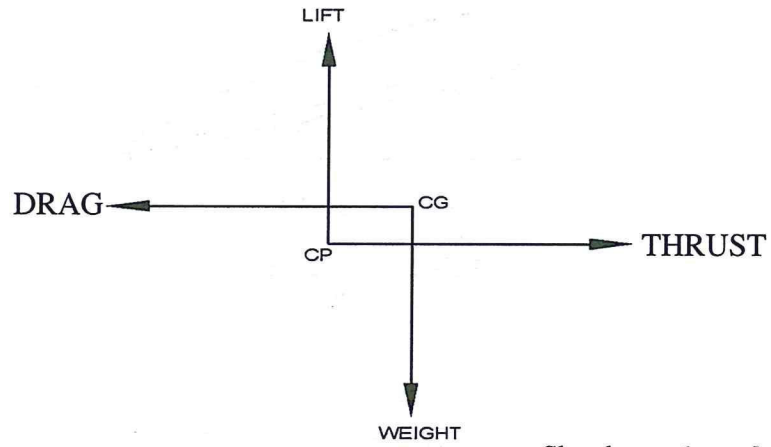
(b)

(b)   Switch socket outlet

(c)

(3 Marks)

(c)   External screw threads

(3 x 1 mark = 3 marks)

11.
(a)

(i)

— Angle of attack **(2 marks)**

RAF

Chordline	½ mark
RAF	½ mark
Sketch	1 mark
Total	2 marks

(ii) **(2 marks)**

Wing

— Anhedral angle

Correct sketch	1 mark
Correct labelling	1 mark
Total	2 marks

(2 marks)

(iii)

Wing chord

Longitudinal axis

Angle of incidence

Correct sketch	1 mark
Correct labelling	1 mark
Total	2 marks

(b) Cd – Co-efficient of drag
e   - Density of air
v^2 – Velocity squared
S.A. – Surface area

(4 x ½ = 2 marks) **(2 marks)**

(c)

LIFT

DRAG ← CG

CP → THRUST

WEIGHT

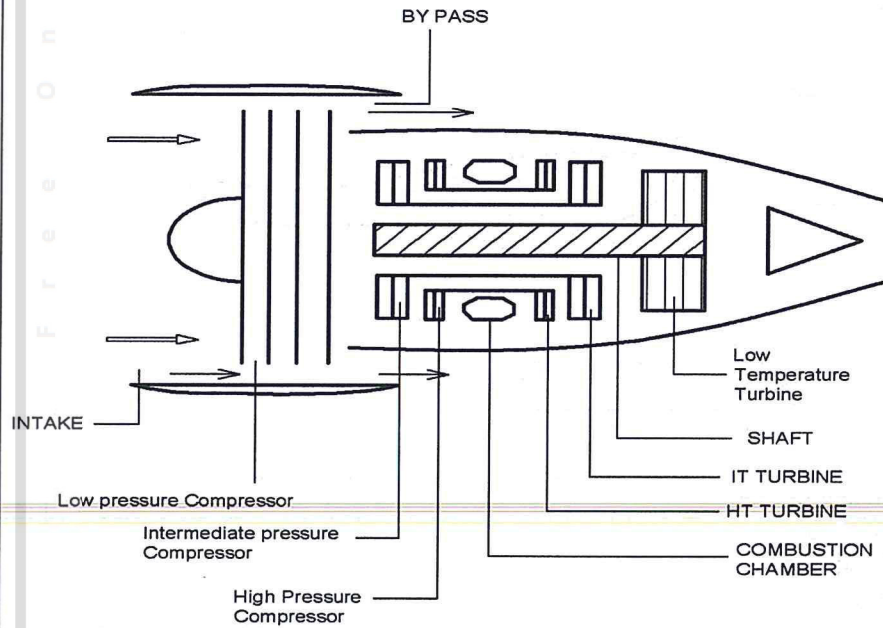**(4marks)**

Sketch = **1 mark**
Labelling **6 x ½ = 3 marks**

Explanation;
- Thrust is parallel to drag
- Lift is parallel to weight
- Lift is in front of the Centre of gravity.
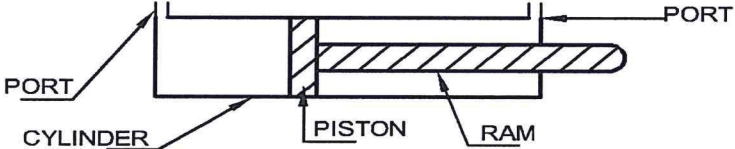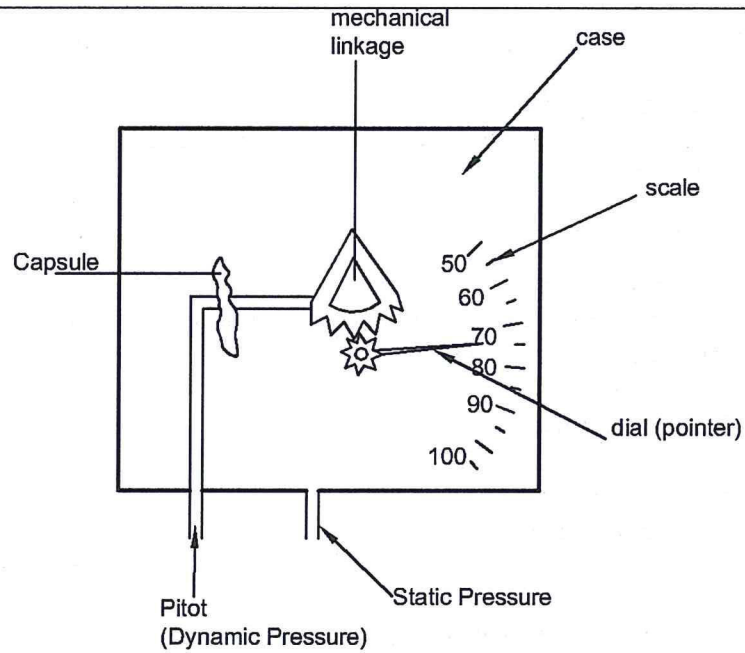- Weight is behind the Centre of pressure.

(2 marks)

(4 x ½= 2 marks)

12.

(14 marks)

BY PASS

INTAKE

Low pressure Compressor

Intermediate pressure Compressor

High Pressure Compressor

Low Temperature Turbine

SHAFT

IT TURBINE

HT TURBINE

COMBUSTION CHAMBER

Sketching = 7 marks
Correctly labelled 10 x ½ = 5 marks
Air flow indication = 2 marks
Total = 14 marks

559

13. (a)	**(i) THRESHOLD** It is the beginning of that portion of the run way usable for landing. (marking the start of Runway for landing) **(ii) RUNWAY** A defined rectangular area on an airport prepared for the landing and take off of aircrafts. **(iii) TOUCH DOWN ZONE** The portion of the runway beyond the threshold intended for landing. (Aeroplanes first contact on the runway) **(3 x 1= 3 marks)**	**(3 marks)**

(b)	**(i)**
	  – Complacency (over sure)
	  – Hurriedness (Hasty reaction)/Poor communication
	  – Ignorance (lack of training)
	  – Failure to observe safety regulations
	  – Indiscipline and attitude.
	  – Poor judgement
	  – Weather conditions
	  – System malfunction
	                      (Any 5 x 1 = 5 marks)
		(5 marks)

	(ii)
	  – Use of hand signals (marshalling)
	  – Use of flares or lights
	  – By radio
	  – Use of painted signs
	                      (4 x ½= 2 marks)
		(2 marks)

(c)	(i) Putting an aircraft in designed safe area for static operations or storage. (ii) Securing the aircraft if it is to stay parked for long periods. (iii) Lifting the aircraft off ground for maintenance. (iv) Supporting the aircraft on trestles after it has been jacked to ensure safety during maintenance or if the aircraft has to stay on jacks for a long period. **(4 x 1 = 4 marks)**	**(4 marks)**
14. (a)	(i) Lighter in weight (ii) Quick in response (dead beat) (iii) It is reliable (iv) Can be easily maintained (v) It's not a shock or fire hazard. **(Any 4 x ½= 2 marks)**	**(2 marks)**
(b)	DOUBLE ACTING UNBALANCED PORT PORT CYLINDER PISTON RAM SKETCH 1 MARK LABEL 2×½ =1 MARK TOTAL 2 MARKS	**(2 marks)**

(b)

- A sealed case ported to static pressure
- A capsule (pressure sensitive) open to pitot pressure
- Capsule movement amplified by **mechanical linkage** which moves a pointer over **a scale**.
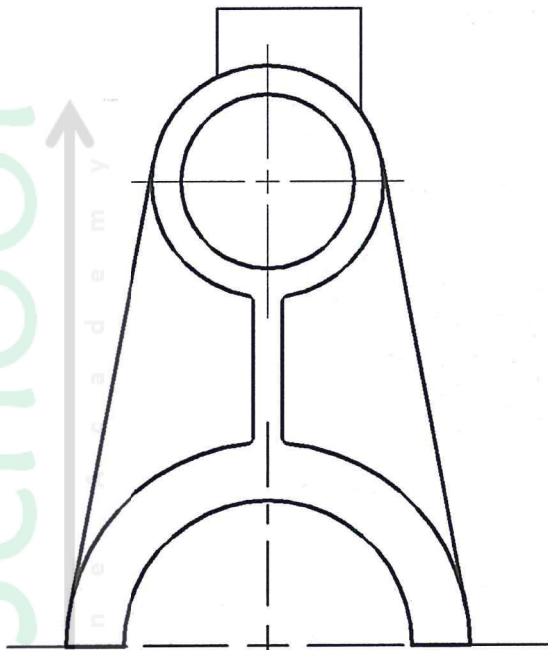
Correct labelling (7 x ½= 3½ marks)
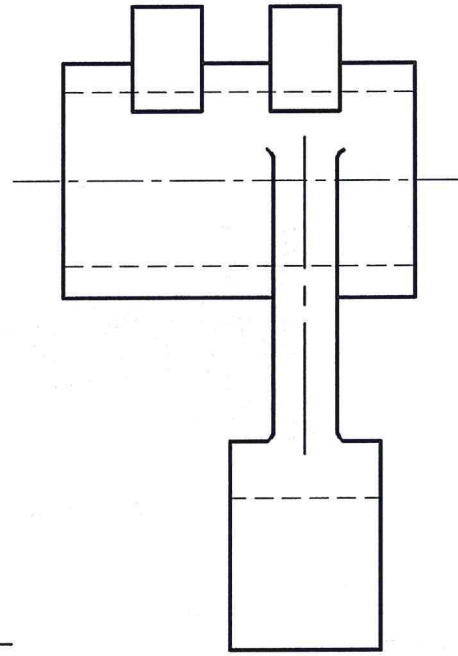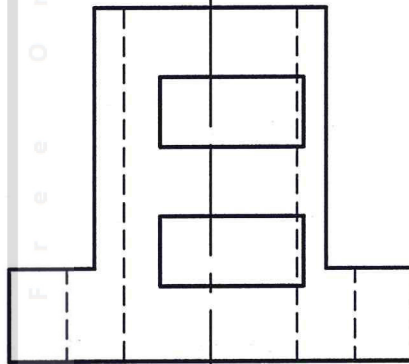Correct sketching (5 x ½ = 2 ½ marks)
Description **4 marks**

(10 marks)

15.

FRONT ELEVATION

END ELEVATION

PLAN

(14 marks)

Angle of Projection 3×½ = 1½
Faces 14×½ = 7
Centre Line 2×1 = 2
Hidden details 3×½ = 1½
Proportionality 1
Neatness 1
Total 14 marks

562