

3.22 AVIATION TECHNOLOGY (450)

3.22.1 Aviation Technology Paper 1 (450/1)

SECTION A (44 marks)

Answer all the questions in this section.

- 1 Outline **three** roles of a ground controller in airport operations. (3 marks)
- 2 (a) Explain **two** methods of controlling movement of tools in an aircraft hangar. (2 marks)
(b) State **four** methods of alerting personnel in the event of fire outbreak. (2 marks)
- 3 State **four** reasons of using timber in aircraft construction. (2 marks)
- 4 Differentiate between the following:
(a) airport and airfield; (2 marks)
(b) runway and taxiway. (2 marks)
- 5 (a) State **four** causes of flow change from laminar to turbulent on an aircraft wing. (2 marks)
(b) Use a labelled sketch to show how a lift is generated on an aerofoil. (4 marks)
- 6 Explain each of the following terms as applied to aircraft structure:
(a) fairing; (1 mark)
(b) monocoque; (1 mark)
(c) rigging position; (1 mark)
(d) winglet. (1 mark)
- 7 Use a labelled sketch to show the forces acting on an aircraft propeller blade during generation of thrust. (6 marks)
- 8 (a) Explain **two** methods of preventing failure in an aircraft hydraulic system. (2 marks)
(b) State the meaning and the function of each of the following aircraft flight systems:
(i) RMI (1½ marks)
(ii) DME (1½ marks)
(iii) ILS (1½ marks)

- 9 Explain **four** advantages which make aluminium alloys best suited for aircraft fabrication. (4 marks)
- 10 Figure 1 shows a bracket drawn in isometric projection.

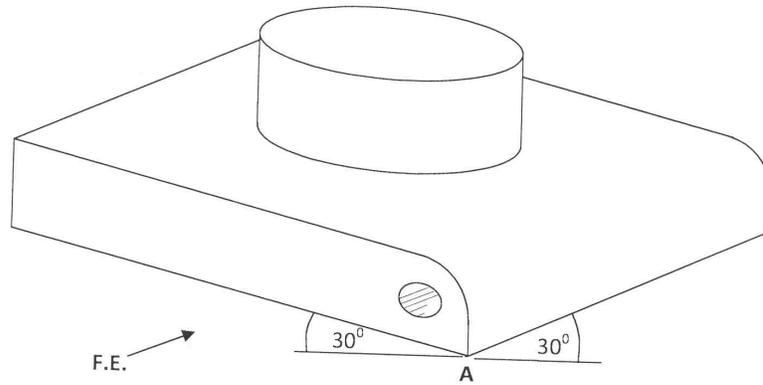


Figure 1

Sketch in good proportion the orthographic views of the bracket in third angle projection. (4½ marks)

SECTION B (56 marks)

Answer **any four** questions from this section.

Candidates are advised to spend not more than 25 minutes on question 11.

- 11** Figure 2 shows the three orthographic views of an aircraft engine bracket drawn in first angle projection.

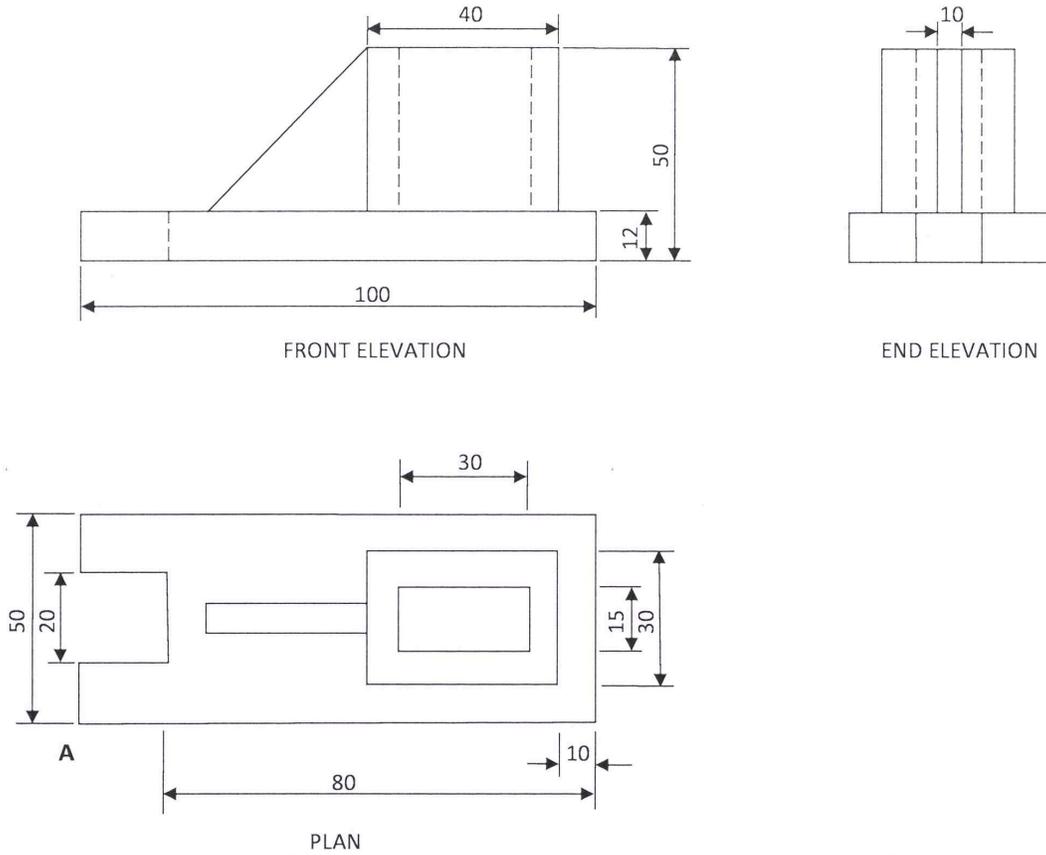


Figure 2

On the isometric grid paper provided on page 10, draw the isometric view of the bracket taking A as the lowest point.

(14 marks)

- 12** With the aid of pressure volume diagrams, describe the operation of the following aircraft engines:

(a) aeropiston; (7 marks)

(b) gas turbine. (7 marks)

- 13** (a) With the aid of a labelled schematic diagram, explain the operation of a typical pneumatic emergency system. (10 marks)
- (b) State **four** reasons why a pneumatic system is preferred to hydraulic system. (4 marks)
- 14** (a) Outline **four** functions of aircraft control tabs in flight. (4 marks)
- (b) With the aid of a labelled diagram, explain the operation of a spring servo tab in pitching mode. (10 marks)
- 15** (a) State **four** advantages of flying an aircraft in the stratosphere layer. (4 marks)
- (b) Explain the meaning of each of the following markings on a runway:
- (i) yellow on black; (1 mark)
 - (ii) black on yellow; (1 mark)
 - (iii) stop and yield; (1 mark)
 - (iv) white on red. (1 mark)
- (c) An aircraft with wing span of 220m and a chord of 25m is flying at 850 KPH at sea level where the density is 1.225 kg/m^3 . If the lift and drag coefficients are 0.545 and 0.0075 respectively, determine:
- (i) lift; (3 marks)
 - (ii) drag. (3 marks)