

2506/304  
GAS TURBINE ENGINE  
Oct./Nov. 2019  
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL  
DIPLOMA IN AERONAUTICAL ENGINEERING  
(AIRFRAMES AND ENGINES OPTION)

MODULE III

GAS TURBINE ENGINE

3 hours

**INSTRUCTIONS TO CANDIDATES**

*You should have the following for this examination:*

*Answer booklet;*

*Drawing instruments;*

*Mathematical tables/Non programmable scientific calculator.*

*This paper consists of EIGHT questions.*

*Answer FIVE questions.*

*All questions carry equal marks.*

*Maximum marks for each part of a question are as indicated.*

*Candidates should answer the questions in English.*

**This paper consists of 3 printed pages.**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**



1. With the aid of labelled sketches, show each of the following with reference to a turbojet engine:
  - (a) fuel system; (7 marks)
  - (b) construction of a pressure control system. (13 marks)
  
2. (a) With reference to turbine engine fire protection system, discuss each of the following:
  - (i) fire extinguisher bottles; (5 marks)
  - (ii) discharge valves. (5 marks)
 (b) Describe the inspection checks carried out on a continuous loop fire detection system. (10 marks)
  
3. (a) With the aid of a labelled sketch, describe the construction and principle of operation of a typical engine oil tank. (13 marks)
 (b) Explain the operation of a gas turbine engine total loss oil system. (7 marks)
  
4. (a) With the aid of a graph, show the propulsive efficiencies of various types of gas turbine engine used on aircraft. (7 marks)
 (b) With the aid of labelled sketches, describe the operation of a turbo ramjet at each of the following mach numbers:
  - (i) Low (M 0.85);
  - (ii) High (M 1.5)
 (13 marks)
  
5. Discuss each of the following ice protection systems on a turbojet engine:
  - (a) hot air; (11 marks)
  - (b) electrical. (9 marks)
  
6. With reference to gas turbine engine cooling:
  - (a) discuss using a labelled sketch, the application of insulation blanket on exhaust system. (12 marks)
  - (b) describe the cooling of the combustion section. (8 marks)



7. (a) With the aid of a labelled sketch, describe the construction of a typical air turbine engine starter. (11 marks)
- (b) Highlight **three** causes, and remedies of each of the following pneumatic starter faults:
- (i) starter does not operate (no rotation);
  - (ii) starter will not accelerate to normal cut-off speed;
  - (iii) starter will not cut-off.
- (9 marks)
8. Discuss each of the following with reference to gas turbine engine maintenance:
- (a) field cleaning; (10 marks)
- (b) engine trimming. (10 marks)

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