EAST AFRICAN SCHOOL OF AVIATION EXAMINATION

SUPPLEMENTARY EXAMS

FLIGHT DISPATCH SECTION

SUBJECT: MASS AND BALANCE

Duration: 2:30HRS

DAY/DATE: TUESDAY- 19/09/2019

TIME: 08.30 – 11:00 HRS

INSTRUCTION TO CANDIDATES

*Answer **all questions in** this paper.*

Maximum marks for each part of a question are as shown

MASS AND BALANCE

Instructions: Answer all questions.

SECTION A

1. Differentiate between the following:

   a) Dry operating mass and basic empty mass

   b) Maximum allowable payload and total traffic load

   c) Maximum landing mass and Maximum take-off mass (6 marks)

2. List 5 operational items that form part of dry operating Mass (5marks)

3. *Given the following;*

   EEW- 60,000, APU oil 500kgs, Engine oil 1000kgs, catering services 3000kgs,

   Cargo tied down equipment's 3000kgs, Navigational kit 200kgs, Male passengers 50 @90kgs, Female passengers 90 @75kgs

   a) Calculate Basic empty weight (3 marks)

   b) Dry operating weight of the Aircraft (3 Marks)

4. EASA Airline operating B788

MTOW -227930, MLW -172365, MRW−228383, MZFW-161025, BOW/DOW-120396, Pax standard weight *Male−95kgs*, *Female-80Kgs*, *Child---35Kgs*

a) *Determine the maximum allowable payload (2 marks)*

b) *Number of male passengers 150, female passengers 90 and children 15, cargo 15,000kgs, LMC rush*

Baggage 5000kgs determine   EZFW (2 marks)

c) *What's the weight of payload going to be offloaded if any   (2 mark)*

d) *Given that take off fuel required is 68000 calculate take-off weight (2 marks)*

5.Block fuel required for EASA502 IS 20000kgs the Aircraft currently have 12000kgs indicated on the fuel gauges, how many imperial gallons of fuel do you request if the fuel density is 0.81 (2 marks)

6. An Aircraft has a MAC of 92 inches. The leading edge of the MAC is 105 inches aft of the datum. If the CG position is 13.7%MAC, what's the CG distance from datum (3 marks)

7. Refer figure 76, 79, and 80 attached, what is the CG in inches aft of datum for loading condition WT-2?   (3 marks)

SECTION B

Mark the correct answers in the following question

1. The actual 'Zero Fuel Mass' is equal to the:

   A. Basic Empty Mass plus the fuel loaded.

   B. Actual Landing Mass plus trip fuel.

   C. Dry Operating Mass plus the traffic load.

   D. Operating Mass plus all the traffic load.

2. The responsibility for determination of the mass of 'operating items' and 'crew members' included within the Dry Operating Mass lies with

   A. the commander.

   B. the authority of the state of registration.

   C .the person compiling the weighing schedule.

   D .the operator.

3. The actual 'Take-off Mass' is equivalent to:

   A. Actual Zero Fuel Mass plus the traffic load

   B. Dry Operating Mass plus the take-off fuel

   C. Actual Landing Mass plus the take-off fuel

   D. Dry Operating Mass plus take-off fuel and the traffic load

.

4. The distance from the datum to the Centre of Gravity of a mass is known as

   A. the lever.

   B. the moment.

   C. the index.

   D. the moment arm or balance arm.

5. For the purpose of completing the Mass and Balance documentation, the Dry Operating Mass

is defined as:

A. The total mass of the aeroplane ready for a specific type of operation excluding all usable fuel and traffic load.

B. The total mass of the aeroplane ready for a specific type of operation excluding all usable fuel.

C. The total mass of the aeroplane ready for a specific type of operation excluding all traffic load.

D. The total mass of the aeroplane ready for a specific type of operation excluding crew and crew baggage.

6. For the purpose of completing the Mass and Balance documentation, the Operating Mass is considered to be Dry Operating Mass plus

A. Ramp Fuel Mass.

B. Trip Fuel Mass.

C. Ramp Fuel Mass less the fuel for APU and run-up.

D. Take-off Fuel Mass.

7. Given the following:

- Maximum structural take-off mass 48 000 kg

- Maximum structural landing mass: 44 000 kg

- Maximum zero fuel mass: 36 000 kg

-Taxi fuel: 600 kg

-Contingency fuel: 900 kg

-Alternate fuel: 800 kg

-Final reserve fuel: 1 100 kg

-Trip fuel: 9 000 kg

Determine the actual take-off mass:

A 47 800 kg

B 48 000 kg

C 48 400 kg

D 53 000 kg

8. An aeroplane is weighed prior to entry into service. Who is responsible for deriving the Dry Operational Mass from the weighed mass by the addition of the 'operational items'?

A. The aeroplane manufacturer or supplier.

B. The commander of the aeroplane.

C. The Operator.

D. The appropriate Aviation Authority.

9. The Dry Operating Mass of an aircraft is 2 000 kg. The maximum take-off mass, landing and zero fuel mass are identical at 3500 kg. The block fuel mass is 550kg and the taxi fuel mass is 50 kg. The available mass of payload is:

A 1 000 kg

B 950 kg

C 1 500 kg

D 1 450 kg

10. Given:

-Dry operating mass = 38 000 kg

-maximum structural take-off mass = 72 000 kg

-maximum landing mass = 65 000 kg

-maximum zero fuel mass = 61 000 kg

-Fuel burn = 8 000 kg

-Take-off Fuel = 10 300 kg

The maximum allowed take-off mass and payload are respectively :

A 73 000 kg and 27 000 kg

B 71 300 kg and 23 000 kg

C 71 300 kg and 25 300 kg

D 73 000 kg and 24 700 kg

11. Which is true of the aeroplane empty mass?

A. It is a component of dry operating mass.

B. It is dry operating mass minus fuel load.

C. It is dry operating mass minus traffic load.

D. It is the actual take-off mass, less traffic load.

12. Following are the aeroplane's structural limits:

-Maximum Ramp Mass: 69 900 kg

-Maximum Take Off Mass: 69 300 kg

-Maximum Landing Mass: 58 900 kg

-Maximum Zero Fuel Mass: 52 740 kg

The performance limited take off mass is 67 450kg and the performance limited landing mass is 55 470 kg. Dry Operating Mass: 34 900 kg Trip Fuel: 6 200 kg Taxi Fuel: 250 kg Contingency & final reserve fuel: 1 300 kg Alternate Fuel: 1 100 kg

The maximum traffic load that can be carried is:

A 25 800 kg

B 17 840 kg

C 18 170 kg

D 13 950 kg

13. During take-off you notice that, for a given elevator input, the aeroplane rotates much more rapidly than expected. This is an indication that :

A. the centre of pressure is aft of the centre of gravity.

B. the centre of gravity may be towards the aft limit.

C. the aeroplane is overloaded.

D. the centre of gravity is too far forward.

14. The crew of a transport aeroplane prepares a flight using the following data:

- Block fuel: 40 000 kg

- Trip fuel: 29 000 kg

- Taxi fuel: 800 kg

- Maximum take-off mass: 170 000 kg

- Maximum landing mass: 148 500 kg

- Maximum zero fuel mass: 112 500 kG

- Dry operating mass: 80 400 kg

The maximum traffic load for this flight is:

A. 32 100 kg

B. 32 900 kg

C. 18 900 kg

D .40 400 kg

15. Loads must be adequately secured in order to:

A. avoid unplanned centre of gravity (cg) movement and aircraft damage.

B. avoid any centre of gravity (cg) movement during flight.

C. prevent excessive 'g'-loading during the landing flare.

D. allow steep turns.

16. The Zero Fuel Mass and the Dry Operating Mass

   A. differ by the mass of usable fuel.

   B. differ by the value of the traffic load mass.

   C. are the same value.

   D. differ by the sum of the mass of usable fuel plus traffic load

17. The centre of gravity is the

   A. centre of thrust along the longitudinal axis, in relation to a datum line

   B. focus along the longitudinal axis, in relation to a datum line

C. neutral point along the longitudinal axis, in relation to a datum line

D. point where all weights of an Aircraft is considered to be centred

18. An aircraft basic empty mass is 3000 kg. The maximum take-off, landing, and zero-fuel mass are identical, at 5200 kg. Ramp fuel is 650 kg, the taxi fuel is 50 kg, The payload available is:

   A. 1 600 kg

   B. 1 550 kg

   C. 2 200 kg

   D. 2 150 kg

19. The maximum mass to which an aeroplane may be loaded, prior to engine start, is :

    A. maximum certificated taxi (ramp) mass.

    B. maximum regulated taxi (ramp) mass.

    C. maximum certificated take - off mass.

    D. maximum regulated take - off mass.

20. In mass and balance calculations which of the following describes the datum?

    A. It is the most forward position of the centre of gravity.

    B. It is the most aft position of the centre of gravity.

    C. It is the distance from the centre of gravity to the point through which the weight of the component acts.

    D. It is the point on the aeroplane designated by the manufacturers from which all centre of gravity   measurements and calculations are made.

SECTION C: PRACTICALS

EASA502 5Y-LYN   B738 is scheduled to depart LHR for AMS   ETD 0630Z 19th September 2019 flight crew composition 3 Male and 4 Female. 5Y-LYN MTOM 75975, MLM 66000 MZFM 62500, AEM 41850, BEI 20 units.

EASA standard weights,

Male 95kg, Female 75kg, Child 35kg, Male crew 90kgs Female crew 70kg.

Passenger's loads

Male 78, Female 81 and Children 14

Distribution: FWd Pax -26

Mid Pax- 48

Aft Pax- 99

Weights

Pantry   560kg

Block fuel   9700kgs

Fuel requirement

Take off fuel required 9300kgs and trip fuel 5500kgs

Belly load

Baggage 3895kgs over which 1950 to be loaded in hold 3,95kgs hold 4,1250kgs hold 2 and 600kgs to be loaded in hold 1

Cargo 1750kgs over which all of the to be loaded in hold 3

Mails 375kgs over which 210kgs is to be loaded on hold 1 and 200kgs to be loaded in hold 4.

Flap 1 take-off

Based on above information prepare load sheet and trim sheet for EASA 502

(20

Marks)