EAST AFRICAN SCHOOL OF AVIATION

SUPPLEMENTARY EXAMINATION

AVIATION SAFETY

SUBJECT: AICRAFT PERFOMANCE

Duration: 2HRs

Date: **TIME: 08:30 AM-10:30 AM**

INSTRUCTION TO CANDIDATES

1. **Answer All questions**
2. **ANSWER ON THE PROVIDED ANSWER BOOKLET**

Answer all questions

SECTION 1 (10 Marks)

1. When performing a balanced take-off, what happens to the accelerate-go and accelerate-stop distances of the runway?
   a) They Equal.
   b) Accelerate go is less than accelerate stop distance.
   c) Balanced take off is uses the longest runway distance.
   d) All of the above
2. Initial climb happens during the second segment of take-off. In this segment, what speed is the aircraft flying?
   a) Maximum continuous thrust (MCT).
   b) V_{mcg}
   c) V_2
   d) V_1
3. Most pilots like to fly the green dot speed. What is TRUE about this speed?
   a) It's the highest speed to fly
   b) It's the lowest speed above stall speed
   c) This is a constant cruise speed that never changes regardless of weight or altitude.
   d) Speed for which the lift-to-drag ratio (L/D) is maximum.
4. When is the Take-off Run available (TORA) equal to Accelerate Stop Distance available (ASDA)? (
   a) When the runway is less than 45m in width
   b) When there is no stopway provided.
   c) When there is a clearway provided.
   d) In case where the runway threshold is displaced.
5. During the second segment of take-off, what speed is the aircraft flying?
   e) Maximum continuous thrust(MCT).
   f) V_{mcg}
   g) V_2
   h) V_1
   i)
6. During take-off roll, how does a downhill slope affect length of runway required for take-off?
   a) There is an increase in thrust thus less runway
   b) Wheel drag increases with increase in slope leading to more runway

c) There is increase in weight leading to less runway length needed.
d) Aircraft accelerates faster thus takes less runway length.

7. Jet aircraft are designed to fly at high altitudes. During cruise, optimum altitude is the altitude where is most efficient and economical to fly. Which of the statements below is TRUE?
   a) Optimum altitude is not fixed but is dependent on the weight of the aircraft
   b) Optimum altitude is a fixed altitude determined by the manufacturer
   c) At optimum altitude, the aircraft burns the most fuel.
   d) All of the above.
8. The following factors affect rate of climb after take-off. Which one does NOT?
   a) Thrust
   b) Tyre pressure
   c) Takeoff weight
   d) Take-off Flap
9. A turbine engine aircraft is required by law to land within _____% of the available runway at destination.
   a) 100%
   b) 70%
   c) 60%
   d) 30%
10. Ground effect is a phenomenon that affects aircraft during landing. Which of the statements is NOT true about ground effect?
    a) Aircraft is unable to land with ground effect
    b) Ground effect delays aircraft touch down
    c) Ground effect is as a result of downwash from wing tip vortices
    d) Low winged aircraft are more affected by ground effect than high wing aircraft

SECTION B : 20 marks

1. What are the effects of wing tip vortices on a flying aircraft? (3 Marks)

2. Use the table below to answer the following questions:

Takeoff Speeds - Dry Runway
V1, VR, V2 for Max Takeoff Thrust

WEIGHT (1000 KG)	FLAPS 1			FLAPS 5			FLAPS 10			FLAPS 15			FLAPS 25		
	V1	VR	V2	V1	VR	V2	V1	VR	V2	V1	VR	V2	V1	VR	V2
90	169	171	175	161	163	168									
85	163	166	171	157	159	164	156	157	162						
80	158	160	167	152	154	160	151	152	158	148	149	155	145	146	153
75	153	155	162	147	148	156	146	147	154	142	144	151	140	141	149
70	147	149	158	141	143	152	140	141	150	137	138	147	135	136	145
65	141	143	153	135	137	147	134	136	146	131	133	143	129	130	140
60	135	136	148	129	131	143	128	129	141	125	126	138	123	124	136
55	128	129	143	123	124	137	122	123	136	119	120	133	117	118	131
50	121	122	137	116	117	132	115	116	130	112	113	128	110	111	126
45	113	114	131	109	110	126	108	108	125	105	106	122	103	104	120
40	105	106	125	101	102	120	100	101	119	98	99	117	96	97	115

Check V1(MCG).

a) What is the Rotation speed V_r for MTOW of 70 tons for a take-off on Flap5? (1 mark

b) What is the trend of take-off speeds as MTOW is increased? (2marks)

c) Explain why lower Flap settings have higher take-off speeds? (5 marks)

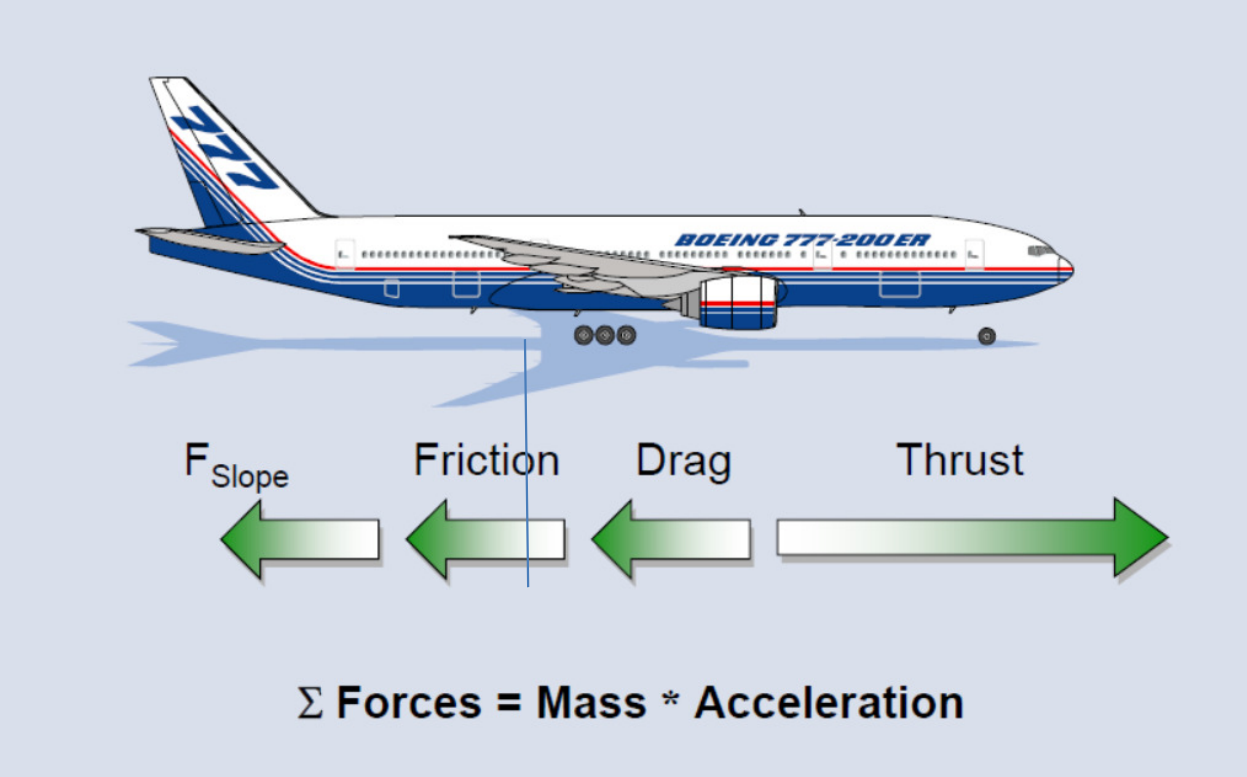
3. How does weight affect endurance during cruise? (6marks)

4. Give three ways to decelerate and stop a landing aircraft? (3 marks)

SECTION C : 20marks

1. Use guidance from the diagram below to calculate NET THRUST of an air craft taking off with ; (6marks)

   SLOPE: + 5degrees (uphill slope)
   AIRCRAFT TAKE-OFF WEIGHT: 90,000Kg
   DRAG: 1500Newtons
   FRICTION: Nil
   Aircraft Thrust: 30,000N



   Show your workings (Tip: Sin(5deg)=0.087)

2. **Describe the difference between Range and Endurance during the Cruise phase of an aircraft**. (4mks)

3. Explain how both FORWARD and AFT centre of gravity affect Range and Endurance of an aircraft in cruise. (14 marks)