SPECIMEN EXAMINATION PAPER

1 What is the SI unit which results from multiplying kg and m/s squared?

a. Newton
b. Psi
c. Joule
d. Watt

2 TAS is:

a. higher than speed of the undisturbed airstream around the aircraft
b. lower than speed of the undisturbed airstream around the aircraft
c. lower than IAS at ISA altitudes below sea level
d. equal to IAS, multiplied by air density at sea level

3 Which of the following statements about a venturi in a subsonic air flow is correct?

(i) The dynamic pressure in the undisturbed flow and in the throat are equal.
(ii) The total pressure in the undisturbed flow and in the throat are equal.

a. (i) is correct and (ii) is incorrect.
b. (i) is incorrect and (ii) is correct.
c. (i) and (ii) are correct.
d. (i) and (ii) are incorrect.

4 The angle between the aeroplane longitudinal axis and the chord line is:

a. angle of incidence.
b. glide path angle.
c. angle of attack.
d. climb path angle.

5 What is the MAC of a wing?

a. Area of wing divided by the span
b. The same as the mean chord of a rectangular wing of the same span
c. The mean chord of the whole aeroplane
d. The 25% chord of a swept wing

6 With flaps deployed, at a constant IAS in straight and level flight, the magnitude of tip vortices:

a. increases or decreases depending upon the initial angle of attack
b. increases
c. decreases
d. remains the same

7 Which of the following is a characteristic of laminar flow boundary layer?

a. Constant velocity
b. Constant temperature
c. No flow normal to the surface
d. No vortices

8 Which of the following is the correct formula for drag?

a. ½ rho V squared CL S
b. ½ rho V (CL)squared S
c. ½ rho V squared AR CD S
d. ½ rho V squared CD S

9 VS is 100 kt at n = 1, what will the stall speed be at n = 2?

a. 200 kt
b. 119 kt
c. 141 kt
d. 100 kt

10 When flying straight and level in 1g flight, slightly below max' all up weight, a basic stall warning system (flapper switch) activates at 75 kt IAS and the aircraft stalls at 68 kt IAS. Under the same conditions at maximum all up weight the margin between stall warning and stall will:

a. increase because increasing weight increases the 1g stall speed.
b. decrease because the 1g stall speed is an IAS.
c. decrease because increasing weight increases the 1g stall speed.
d. remain the same because increased weight increases the IAS that corresponds to a particular angle of attack.

11 After takeoff why are the slats (if installed) always retracted later than the trailing edge flaps?

a. Because VMCA with slats extended is more favourable compared to the flaps extended position.
b. Because flaps extended gives a large decrease in stall speed with relatively less drag.
c. Because slats extended provides a better view from the cockpit than flaps extended.
d. Because slats extended gives a large decrease in stall speed with relatively less drag.

12 What must happen to the CL when flaps are deployed while maintaining a constant IAS in straight and level flight?

a. increase then decrease
b. remain constant
c. decrease
d. increase

13 If an aircraft is longitudinally statically unstable, at the same time it will be:

a. dynamically unstable
b. dynamically neutral
c. dynamically stable
d. dynamically positively stable

14 Positive static lateral stability is the tendency of an aeroplane to:

a. roll to the right in the case of a positive sideslip angle (aeroplane nose to the
b. roll to the left in the case of a positive sideslip angle (aeroplane nose to the left).
c. roll to the left in a right turn.
d. roll to the right in a right turn.

15 To provide the required manoeuvre stability an aircraft in straight and level flight (n = 1) requires a stick force of 150 lb/g. If n = 2.5 what is the increase in stick force required?

a. 225 lb
b. 375 lb
c. 150 lb
d. No increase

16 What effect does a positive swept wing have on static directional stability?

a. Destabilising dihedral effect
b. Stabilising
c. Negative dihedral effect
d. No effect

17 What type of wing arrangement decreases static lateral stability?

a. Anhedral
b. Dihedral
c. High wing
d. Large wing span

18 When considering the relationship between lateral static stability and directional stability:

a. dominant lateral static stability gives an increased tendency for dutch roll
b. dominant lateral static stability gives an increased tendency for spiral instability
c. dominant directional static stability gives an increased tendency for dutch roll
d. no effect because they are mutually independent

19 Which statement is correct?

a. The stick force per 'g' increases when the CG is moved aft.
b. The stick force per 'g' must have both upper and lower limits in order to assure acceptable control characteristics.
c. If the slope of the fe-n line becomes negative, generally speaking this is not a problem for control of an aeroplane.
d. The stick force per 'g' can only be corrected by means of electronic devices (stability augmentation) in the case of an unacceptable value.

20 At cruising speed an aircraft fitted with spoilers, inboard ailerons and outboard ailerons will use which of the following combinations?

a. Inboard ailerons and spoilers.
b. Inboard and outboard ailerons.
c. Outboard ailerons only.
d. Spoilers and outboard ailerons.

21 How does the exterior view of an aircraft change when trim is adjusted to maintain straight and level flight with speed decrease?

a. No change
b. Elevator up, trim tab down
c. Elevator down, trim tab up
d. Elevator changes due to horizontal stabiliser changing

22 What is pitch angle?

a. The angle between the chord line and the horizontal plane.
b. The angle between the longitudinal axis and the horizontal plane.
c. The angle between the chord line and the longitudinal axis.
d. The angle between the relative airflow and the longitudinal axis.

23 What is the location of mass balance weights?

a. Always on the hinge line, irrespective of the type of aerodynamic balance
b. On the hinge line if the control surface doe not have an inset hinge
c. On the hinge line if the control surface has an inset hinge
d. In front of the hinge line

24 Which of the following is the correct example of differential aileron deflection to initiate a left turn?

a. Left aileron up 5 degrees, right aileron down 2 degrees
b. Right aileron up 5 degrees, left aileron down 2 degrees
c. Left aileron up 2 degrees, right aileron down 5 degrees
d. Right aileron up 2 degrees, left aileron down 5 degrees

25 Which statement in respect to trim settings of a stabiliser is correct?

a. With a nose heavy aeroplane, the stabiliser leading edge should be higher than for a tail heavy aeroplane.
b. With a nose heavy aeroplane, the stabiliser leading edge should be lower than for a tail heavy aeroplane.
c. With CG on the forward limit, the stabiliser should be fully adjusted nose down to obtain maximum elevator deflection at rotation during take-off.
d. Since typical take-off speeds are independent of CG position, stabiliser settings are dependent only on flap setting.

26 Why does a transport aircraft with powered controls use a horizontal stabiliser trim?

a. Pilot input is not subject to aerodynamic control forces
b. Trim tabs are not effective enough
c. Overly complex mechanism
d. Trim tabs would increased Mcrit

27 An aircraft of 50 tonnes mass, with two engines each of 60,000 N Thrust and with an L/D ratio of 12:1 is in a straight steady climb. Taking ‘g’ to be 10 m/s/s, what is the climb gradient?

a. 12%
b. 24%
c. 15.7%
d. 3.7%

28 If lift in straight and level flight is 50,000 N, the lift of an aircraft in a constant altitude 45 degree bank would increase to?

a. 50,000 N
b. 60,000 N
c. 70,000 N
d. 80,000 N

29 In a straight steady descent:

a. Lift is less than weight, load factor is equal to one
b. Lift is less than weight, load factor is less than one
c. Lift is equal to weight, load factor is equal to one
d. Lift is equal to weight, load factor is less than one

30 Two aircraft of the same weight and under identical atmospheric conditions are flying level 20 degree bank turns. Aircraft 'A' is at 130 kt, aircraft 'B' is at 200 kt.

a. The turn radius of 'A' will be greater than 'B'.
b. The coefficient of lift of 'A' will be less than 'B'.
c. The load factor of 'A' is greater than 'B'.
d. Rate of turn of 'A' is greater than 'B'.

31 VMCL can be limited by: (i) engine failure during takeoff, (ii) maximum rudder deflection.

a. Both (i) and (ii) are incorrect.
b. (i) is incorrect and (ii) is correct.
c. (i) is correct and (ii) is incorrect.
d. Both (i) and (ii) are correct.

32 As Mach number increases at transonic speed, tuck under is caused by the CP moving (i) and downwash at the tail (ii):

a. (i) aft, (ii) increasing
b. (i) aft, (ii) decreasing
c. (i) fwd, (ii) increasing
d. (i) fwd, (ii) decreasing

33 The regime of flight from the critical Mach number (Mcrit) to approximately M1.3 is called?

a. Transonic.
b. Hypersonic.
c. Subsonic.
d. Supersonic.

34 The speed range between high and low speed buffet:

a. decreases during a descent at a constant Mach number.
b. is always positive at Mach numbers below MMO.
c. increases during a descent at a constant IAS.
d. increases during climb.

35 What happens to the local speed of sound of air passing through an expansion wave?

a. Increase.
b. Decrease.
c. Remain the same.
d. Decrease up to a certain Mach number and then increase.

36 What happens to the Mach number of the airflow as it passes through an expansion wave?

a. Increase
b. Constant
c. Decrease
d. Decreases then above a certain Mach number it will increase

37 Which of the following is required so the flight crew can determine the effects of compressibility?

a. IAS
b. TAS
c. Mach number
d. EAS

38 An aircraft is descending at a constant Mach number, which of the following operational speed limitations may be exceeded?

a. VMO
b. VNE
c. MMO
d. VD

39 An aircraft is in straight and level flight has a CL of 0.42 and a 1 degree increase in angle of attack would increase the CL by 0.1. Following a gust which increases the angle of attack by 3 degrees, what load factor would the aircraft be subject to?

a. 1·7
b. 0·7
c. 1·4
d. 1·0

40 Which of the following can effect VA?

a. Mass and pressure altitude.
b. Mass only.
c. Pressure altitude only.
d. It remains a constant IAS.

41 A single engine aircraft with a constant speed propeller is in a gliding descent with the engine idling, what would be the effect of increasing the propeller pitch?

a. Increased L/Dmax, increased rate of descent
b. Decreased L/Dmax, increased rate of descent
c. Increased L/Dmax, decreased rate of descent
d. Decreased L/Dmax, decreased rate of descent

42 A single engine aircraft with a constant speed propeller is in a gliding descent with the engine idling, what would be the effect of decreasing the propeller pitch?

a. Increased L/Dmax, increased rate of descent.
b. Decreased L/Dmax, increased rate of descent.
c. Increased L/Dmax, decreased rate of descent.
d. Decreased L/Dmax, decreased rate of descent.

43 The advantage of a constant speed propeller over a fixed pitch propeller is:

a. higher maximum thrust available
b. higher maximum efficiency
c. more blade surface area available
d. nearly maximum efficiency over wide speed range

44 With a clockwise rotating propeller (when viewed from the rear) at low forward speed, the propeller asymmetric blade effect will cause:

a. roll to the left
b. yaw to the left
c. roll to the right
d. yaw to the right

ANSWERS TO SPECIMEN EXAM PAPER

1	**A**	**21**	**B**	**41**	**C**
2	**C**	**22**	**B**	**42**	**B**
3	**B**	**23**	**D**	**43**	**D**
4	**A**	**24**	**A**	**44**	**B**
5	**B**	**25**	**B**		
6	**C**	**26**	**B**		
7	**C**	**27**	**C**		
8	**D**	**28**	**C**		
9	**C**	**29**	**B**		
10	**D**	**30**	**D**		
11	**D**	**31**	**A**		
12	**B**	**32**	**B**		
13	**A**	**33**	**A**		
14	**B**	**34**	**C**		
15	**A**	**35**	**B**		
16	**B**	**36**	**A**		
17	**A**	**37**	**C**		
18	**A**	**38**	**A**		
19	**B**	**39**	**A**		
20	**A**	**40**	**A**		

EXPLANATIONS TO SPECIMEN EXAM PAPER

Q 1
(a) If a mass is accelerated a force must have been applied. The kg is the SI unit for mass and m/s squared is the SI unit for acceleration. The applied force can be determined by multiplying the mass by the acceleration and the answer must use the SI unit for force - the Newton.

Q 2
(c) True Air Speed (TAS) is the relative velocity between the aircraft and undisturbed air which is close to, but unaffected by the presence of the aircraft. Changing the TAS (the speed of the aircraft through the air; the only speed there is) compensates for changes in air density and ensures a constant mass flow of air over the wing. If an altitude below ISA sea level is considered, the air density would be higher and therefore the TAS would have to be lower than IAS to compensate and keep Lift constant.

Q3
(b) Bernoulli's Theorem states: In the steady flow of an "ideal" fluid the sum of the pressure and kinetic energy per unit volume remains constant. Statement (i) is incorrect because the dynamic pressure in the throat of the venturi is higher than the free stream flow. Statement (ii) is correct.

Q 4
(a) The angle between the chord line and longitudinal axis is called the angle of incidence - which is fixed for a wing, but may be variable for the tailplane (horizontal stabiliser).

Q 5
(b) A rectangular wing of this chord and the same span would have broadly similar pitching moment characteristics. The MAC is a primary reference for longitudinal stability considerations.

Q 6
(c) Wing tip vortices are strongest with the aircraft in the clean conFigureuration. With flaps down, the flaps generate their own vortices which interfere with and weaken the main, tip vortices. (AIC 17/1999).

Q 7
(c) The "key" characteristic of a laminar boundary layer is that there is no flow normal to the surface.

Q 8
(d) Drag = 1/2 rho x V squared x CD x S.

Q 9

(c) 'g' is the colloquial symbol for load factor. Load factor is the relationship between Lift and Weight. When an aircraft is banked in level flight, Lift must be greater than Weight and the relationship can be calculated by using the formula: L = 1/cos phi (where phi = bank angle). To calculated the stall speed in a 2g turn, multiply the 1g stall speed by the square root of 2, in this case 1.41. 100 x 1.41 = 141 kt. [It can be said that 'g' is the same as 1/cos phi].

Q 10
(d) Stalling is caused by airflow separation. The amount of airflow separation is due to the relationship between the adverse pressure gradient and boundary layer kinetic energy. The adverse pressure gradient will increase if angle of attack is increased. A 1g stall occurs at the critical angle of attack (CLmax). A stall warning must begin with sufficient margin to prevent inadvertent stalling, so a stall warning device must also be sensitive to angle of attack. Therefore, a 1g stall will occur at the critical angle of attack and the stall warning will activate at an angle of attack which is slightly less. In 1g flight each angle of attack requires a particular IAS (dynamic pressure). An increase in weight will not alter the respective angles of attack, but will increase both the IAS at which the stall warning activates and the IAS at which the 1g stall occurs but the margin between them will remain essentially the same

Q 11
(d) Extended slats do not change CL or CD significantly, they do however increase CLmax and therefore give greater margin to the stall speed.

Q 12
(b) Reference Figure 8.22. Point 'A' to Point 'B' illustrates the wording of the question and it can be seen that CL must remain constant if IAS is constant and level flight is to be maintained as flaps are deployed, in order that the Lift remains the same as the Weight

Q 13
Negative Longitudinal static stability means the aircraft will be further displaced from equilibrium following removal of the original disturbing force. Therefore, over a period of time (Dynamic Stability) it can NEVER be Dynamically stable.

Q 14
(b) Paragraph 10.31 states: "When an aircraft is subject to a positive sideslip angle, lateral stability will be evident if a negative rolling moment coefficient results". It can be seen from Figure 10.57 that a positive sideslip angle is aeroplane nose left – right sideslip. Answer (b) is correct because the tendency of an aeroplane to roll to the left in a right sideslip is static lateral stability.

Q 15
To calculate stick force per 'g' it must be remembered that in straight and level flight the aircraft as at 1g. Therefore the increment is only 1.5g. 150 lb/g x 1.5 = 225 lb.

Q 16
Sideslip angle decreases the effective sweep on the wing 'into wind' and increases the effective sweep on the wing 'out of wind'.
Decreasing effective sweep angle increases Lift and therefore Induced Drag. This will give a positive contribution to Directional Static Stability - making (b) the only correct answer.

Q 17
Dihedral (Geometric) makes a powerful contribution to Lateral static stability. A wing mounted high on the fuselage gives a positive contribution the Lateral static dtability. Large wing span makes no contribution to Lateral static stability. A reduction in Dihedral will reduce Lateral static stability - as the definition of Geometric Dihedral is "The upward inclination of the plane of the wing from the horizontal. If the plane of the wing is angled below the horizontal, this will further decrease Lateral static stability and is known as Anhedral - making answer (a) correct.

Q 18
The relationship between Lateral Static and Directional Static Stability will determine which type of Dynamic instabilty the aircraft is most likely to exhibit.

If Static Lateral Stability is dominant, the extreme incrase in Lift on the wing into wind will also give a significant increase in Induced Drag. Thus, as the wing 'into wind' is accelerating upwards it will also be accelerating rearwards. By the time the aircraft has reached 'wings level' the other wing tip will be moving forward about the CG, which will increase its Lift and the aircraft will tend to roll back in the opposite direction and this process will continue and maybe diverge - this is Dutch Roll. Because the Lateral Static Stability is much 'stronger' than the Directional Static Stability, the fin is not able to prevent the yawing motion.

It is the DOMINANCE of Lateral over Directional that determines the likelyhood of Dutch Roll - therefore, decreased Directional Static Stability AND increased Lateral Static Stability will make Lateral Static Stability dominant and the aircraft susceptable to Dutch Roll.

If Static Lateral Stability is dominant, the aircraft will be susceptable to Spiral instability. This is because the fin will give a larger yawing and consequent rolling moment with the aircraft in a sideslip than the Lateral Static Stability is able to counter.
Similarly to the case of Dutch Roll - the aircraft can be more susceptable to Spiral Instability due to a decrease in Lateral Static Stability AND and increase in Directional Static Stability - it's the dominance that should be considered.

Q 19
(b) This question concerns stick force per 'g' . There must be both an acceptable upper and lower limit to stick force. The illustrations of Figure 10.36 show the factors which affect the gradient of stick force per 'g' and the text highlights the requirements for any transport aircraft.

Q 20
At cruise speed the flaps will be up, which de-activates (locks-out) the outboard ailerons. Therefore, the inboard ailerons and the roll spoilers will operate, making (a) the only correct answer.

Q 21
There is only one tab that moves in the same direction as the control surface - the anti-balance tab, so a good general rule is that all tabs (except one) move in the opposite direction to the control surface.
The best approach to questions about controls and / or tabs is to first consider what you want the aeroplane to do. In this case, a speed decrease will generate a nose down pitching moment. To oppose this, the pilot need to increase back pressure on the pitch control. This moves the elevator up. To hold the elevator in this new position, the trim tab is moved down. Thus (b) is the only correct answer.

Q 22
(b) In this context, pitch angle is defined as: "the angle between the longitudinal axis and the horizontal plane". Pitch angle can also be referred to as "Body Angle" or as "The Pitch Attitude".

Q 23
Mass balance weights are used to prevent control surface flutter. Flutter is prevented by re-distributing the mass of the control surface to move its CG forward onto its hinge line. To accomplish the forward movement of control surface CG a mass balance weight is attached in front of the hinge line. This makes (d) the only possible answer.

Q 24
Differential ailerons are used to decrease adverse aileron yaw. Adverse aileron yaw is the result of increased Induced drag from the down-going aileron. A mechanism makes the down-going aileron move through a smaller angle than the up-going aileron.

Q 25
A nose heavy aeroplane is one in which a backward force on the pitch control is required to maintain level flight. To trim-out the backward stick force a down force on the tailplane is required. A trimming tailplane must have its incidence decreased (leading edge lowered) to generate the required tail downforce - making (b) the only correct answer.
Answer (c) is incorrect because one of the advantages of a trimming tailplane is that the effective pitch control is not influence by the amount of pitch trim used.
Answer (d) is incorrect because its statement is complete rubish.

Q 26
Compared to a trim tab, the advantages of using a Variable Incidence Trimming Tailplane are that it is very powerful and gives an increased ability to trim for a larger speed and CG range, it reduces trim drag, and it does not reduce the 'effective' range of the pitch control. Answer (a) is incorrect because pilot input moves the elevator, not the trimming tailplane. Answer (c) is incorrect because its relative complexity is a disadvantage. Answer (d) is incorrect because Mcrit is not affected by trim tabs. Answer (b) is the only possible correct answer.

Q 27
(c) Climb gradient is the ratio of vertical height gained to horizontal distance travelled, expressed as a percentage. Trigonometrically, the tangent of the climb angle (gamma) will give climb gradient (tan = opp/adj), where 'opp' is the vertical height gained and 'adj' is the horizontal distance covered. Unfortunately these values are not provided in the question, or indeed in real life - so other values must be substituted and certain assumptions made in order to "calculate" the answer. Climb angle is the same as the angle between the Weight vector and W cos gamma.

The 'adjacent' is W cos gamma or Lift and the 'opposite' is the backward component of Weight or W sin gamma.
From the question Weight (50,000kg x 10 = 500,000N), Thrust (60,000N x 2 = 120,000N) and Drag (1/12 of Lift) are known or can be estimated. The value of Lift is not given, but we do know the Weight, so it has to be assumed that Lift and Weight are equal (at small climb angles [<20 degrees], although we know Lift is in fact less than Weight, for practical purposes the difference is insignificant). Therefore, the value of Lift is assumed to be 500,000N and the Drag to be 500,000N / 12 = 41667N.

The formula for climb gradient is: Percentage Gradient = (T - D / W) x 100. i.e. Thrust minus Drag is the backward component of Weight or 'opp' and Weight is the 'hyp'. For small angles [<20 degrees] of climb or descent the length of the hypotenuse and adjacent are, for all practical purposes, the same; so the sine formula can be used and will give an answer which is accurate enough. We now have Thrust (120,000N) minus Drag (41667N) divided by Weight (500,000N) = 0.157 x 100 = 15.7% Climb Gradient.

Q 28
In level flight, Lift is a function of the bank angle. The formula is L = 1 / cos phi
In a 45 dgree bank the lift is increased by 1.41 (41%)
50,000N x 1.41 = 70500N, making (c) the correct answer.

Q 29
(b) Lift is less than Weight in a steady descent. Load factor is Lift Divided by Weight, but when the aircraft is in equilibrium in a steady descent the vertical force opposing the Weight is the Total Reaction. However, JAR 25.321states: "Flight load factors represent the ratio of the aerodynamic force component (acting normal to the assumed longitudinal axis of the aeroplane) to the weight of the aeroplane". This clarifies the issue completely; such that in a steady descent Lift is less than Weight and the load factor is less than one. Load factor is useful when considering the loads applied to the aeroplane in flight. While the load factor will not be altered significantly in a steady descent, the concept holds true.

Q 30
(d) When considering turning, remind yourself first of the appropriate formulae – these help consolidate the variables.
1. L = 1 / cos phi reminds us that the only variable for Lift and hence load factor in a turn is bank angle.
2. The next two formulae must be considered together:
(a) Radius = V squared / g tan phi
(b) Rate=V/ Radius

Q 31
(a) VMCL is the minimum IAS at which directional control can be maintained with the aircraft in the landing conFigureuration, BUT with the added ability of being able to roll the aircraft from an initial condition of steady flight, through an angle of 20 degrees in the direction necessary to initiate a turn away from the inoperative engine(s), in not more than 5 seconds. VMCL is the "odd one out" among the VMC speeds for this reason. It can clearly be seen that neither statement is correct, making (a) the correct answer.

Q 32
The initial formation of a shockwave is on the top surface of the wing at the point of maximum local velocity - this is usually the thickest part of the wing, at the wing root. Shockwaves cause a localised reduction in CL. On a swept wing this gives a reduction in Lift forward of the CG and the CP will move aft. In addition, shockwave formation at the wing root reduces downwash at the tailplane. These factors together cause Mach Tuck, Tuck Under or High Speed Tuck (three names for the same phenomina).

Q 33
(a) Reference to Figure 13.2 will show that the speed region between Mcit and approximately M1.3 is called "Transonic".

Q 34
(c) It can be seen that the speed range between high and low speed buffet decreases with increasing altitude.

Q 35
Speed of sound is proportional to temperature. The temperature decreases as it passes through an expansion wave, therefore the local speed of sound decreases.

Q 36
Mach number is proportional to TAS and inversely proportional to Local Speed of Sound. Through an expansion wave, velocity increases and temperature decreases. Therefore the Mach number of the airflow will increase.

Q 37
Compressibility, in this context, is the general term which refers to the effects on the aircraft when flying faster than approximately Mach 0.4. To determine the effects of compressibility the flight crew need to know the aircraft Mach number.

Q 38

Q 39

Q 40
(a) For SMALL aircraft VA is the speed at the intersection of CLmax and the positive limit load factor and is dependant upon mass (which will affect the speed at which CLmax is achieved).
As this is the examination is for ATPL, LARGE aeroplanes (JAR 25) must be considered.
VA is defined as:- The highest speed at which sudden, full elevator deflection (nose up) can be made without exceeding the design limit load factor - making VA slower than the speed intersection of CLmax and the positive limit load factor. This is due to the effect of the tailplane moving downward when the aircraft is being pitched nose up increasing the effective angle of attack of the tailplane and increasing the load imposed on the whole aircraft. This is aerodynamic damping, which is a function of the tailplane vertical velocity and TAS. Therefore VA varies with both aircraft mass and pressure altitude.

Q 41
Increasing the propeller pitch, by pulling the propeller RPM control lever backwards to "Decrease RPM" will drive the blades towards the coarse pitch stop. This decreases the Parasite drag of the aeroplane, thus increasing L/Dmax and allowing a decreased rate od descent.

Q 42
(b) The key to answering this question successfully is an understanding of what is meant by ".....decreasing the propeller pitch." Decreasing the propeller pitch is reducing the blade angle. This would increase the aircraft's Parasite area and Total Drag, which would decrease L/Dmax. Because of decreased L/Dmax the aircraft would have an increased rate of descent.

Q 43
(d) IAS is a measure of dynamic pressure, whereas TAS is the speed of the aircraft through the air. Changes in TAS are used to compensate for changes in air density to maintain a constant dynamic pressure. The lower the density, the higher the TAS must be to maintain a constant IAS.

Q 44
Asymmetric blade effect gives more thrust on the side with the down-going blade with a clockwise rotating propeller, this gives a left turning moment.