



GENERAL INSTRUCTIONS TO THE CANDIDATES

1. Candidates are instructed to answer the questions as per Bloom's Taxonomy knowledge level (K_1 to K_6)
2. Candidates are strictly instructed not to write anything in the question paper other than their roll number.
3. Candidates should search their pockets, desks and benches and handover to the Hall Superintendent/ Invigilator if any paper, book or note which they may find therein as soon as they enter the examination hall.
4. Candidates are not permitted to bring electronic watches with memory, laptop computers, personal systems, walkie-talkie sets, paging devices, mobile phones, cameras, recording systems or any other gadget / device /object that would be of unfair assistance to him / her.
5. Corrective measures as per KCT examination policies will be imposed for malpractice in the hall like copying from any papers, books or notes and attempting to elicit the answer from neighbours.

B.E/B.TECH DEGREE EXAMINATIONS:JUNE 2015

(Regulation 2014)

Second Semester

AERONAUTICAL ENGINEERING

U14AET201: Elements of Aeronautics

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion (A): Turn Coordinator is a gyro based instrument [K₁]
Reason (R): Rigidity and Precision is the main principle for Artificial horizon
 - a) Both A and R are true and R is the correct explanation of A
 - b) Both A and R are true and R is not the correct explanation of A
 - c) A is true but R is false
 - d) A is false but R is true

2. The lift and drag forces, acting on a wing cross section [K₂]
- a) vary linearly with the angle of attack b) depend on the pressure distribution about the wing cross section
- c) are normal to each other at just one angle d) are proportional to each other, independent of angle of attack
3. A symmetrical aerofoil at zero degree angle of attack will, in level flight produce [K₂]
- a) most of its lift on the lower surface b) most of its lift on the upper surface
- c) the same amount of lift on the upper and lower surfaces d) zero lift
4. Which of the following must increase as a helicopter accelerates in level flight? [K₂]
1. Total rotor thrust
2. Parasite drag
3. Horizontal component of total rotor thrust
4. Vertical component of total rotor thrust
- a) 1,3 and 4 b) 1, 2 and 4
- c) 1,2 and 3 d) 2,3
5. Select the airfoils in the sequence based on the thickness to chord ratio [K₁]
1. 23012
2. 63218
3. 712A315
4. 2409
- a) 1-2-3-4 b) 4-1-3-2
- c) 4-3-2-1 d) 3-1-2-4
6. What is the purpose of wing ribs [K₁]
- a) To withstand the fatigue stresses b) To shape the wing and support the skin
- c) To house the fuel and the landing gear d) To provide local support for the skin
7. On a turn and slip indicator, needle to the left and ball to the right indicates [K₂]
- a) turn to the right, not enough bank b) turn to the left, too much bank
- c) turn to the left, not enough bank d) turn to the right, too much bank
8. What is the major difference between the operation of the main rotor and the tail rotor? [K₂]
- a) The tail rotor has no cyclic pitch control b) The main rotor has no cyclic pitch control
- c) The tail rotor has no collective pitch control d) The tail rotor is always slower than the main rotor

9. What is the purpose of a slat on the leading edge? [K₁]
- a) Decelerate the air over the top surface b) Thicken the laminar boundary layer over the top surface
- c) Increase the camber of the wing d) Allow greater angle of attack

10. Match list I and Match list II and select the correct answer using the codes given below [K₁]

List I	List II
A. <0.8	1. Hypersonic
B. 0.8 – 1.2	2. Subsonic
C. 1.2 - 5	3. Supersonic
D. >5	4. Transonic

	A	B	C	D
a)	4	3	1	2
b)	2	4	3	1
c)	3	4	2	1
d)	1	2	3	4

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Define the term ‘Empennage’ [K₂]
12. Define: Mach number and Lift [K₂]
13. What are the various structural members in a fuselage? [K₁]
14. What are the basic structural loads experienced by an aircraft? [K₂]
15. What is FADEC? [K₂]
16. Define Pitch of a propeller. [K₂]
17. What are the types of rockets on the basis of source of energy employed? [K₂]
18. What are fuel cells? [K₂]
19. List out the structural components of Helicopter. [K₁]
20. List out the four space research agencies in the world [K₂]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. (i) Describe briefly the physical properties and structure of the atmosphere with a neat sketch (7) [K₂]
- (ii) Calculate the standard atmosphere values of temperature, pressure and density at a geopotential altitude of 14 km (T= 216.66 K) (7) [K₃]
22. (i) Explain the construction of typical aircraft wing and fuselage structure with neat sketches (10) [K₂]
- (ii) State the four forces acting on an aircraft in flight (4) [K₂]
23. Describe a turboprop engine with a neat sketch and Bring out the essential differences between piston engines and jet engines for aircraft propulsion [K₃]
24. (i) Explain the construction and functions of any two flight instruments with neat sketches (10) [K₃]
- (ii) Draw an aerofoil and explain its nomenclature. (4) [K₂]
25. (i) Describe briefly working principle of Rocket engine with a neat sketch (7) [K₃]
- (ii) Write short notes on: Space debris and Launch site selection (7) [K₂]
26. Explain the basic principles of Engine fuel system and Flight control system with the help of layouts [K₃]
