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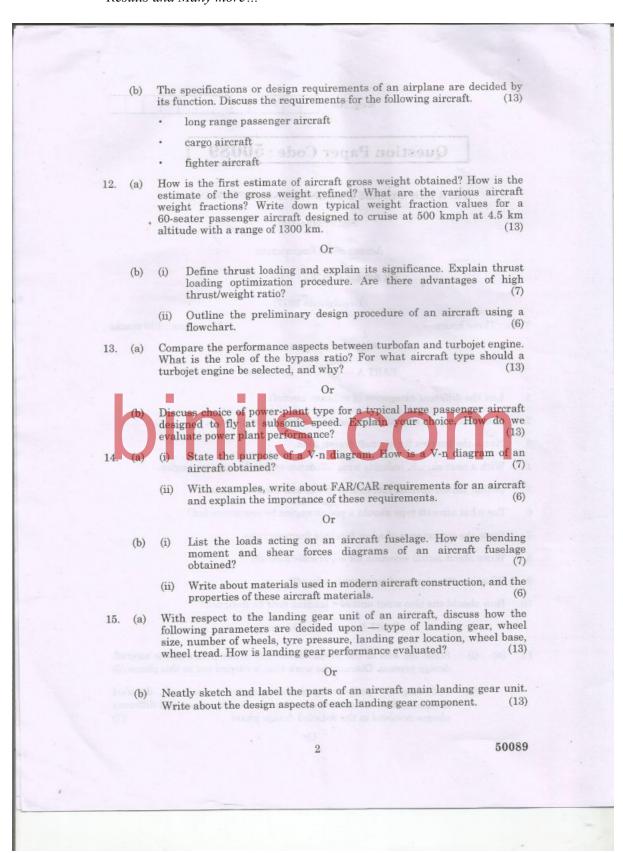
|  | Reg. No.:   |
|--|---|
|  | Question Paper Code: 50089  |
|  | B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.   |
|  | Sixth Semester  |
|  | Aeronautical Engineering  |
|  | AE 8604 – AIRCRAFT DESIGN   |
|  | (Regulations 2017)  |
|  | Time: Three hours Maximum: 100 marks  |
|  | Answer ALL questions.   |
|  | PART A — $(10 \times 2 = 20 \text{ marks})$   |
|  | 1. List the different categories of military aircraft.  |
|  | 2. Sketch the front view of a cantilever low wing monoplane.  |
|  | 3. Name the sources for aircraft design data.   |
|  | 4. With a neat sketch, indicate wing incidence and tail incidence angles.   |
|  | 5. Define 'thrust specific fuel consumption' and state its units.   |
|  | 6. For what aircraft type should a piston engine be recommended?  |
|  | 7. State the importance of a low fuselage fineness ratio.   |
|  | 8. Write about airfoil selection for supersonic aircraft.   |
|  | 9. What are the phases of an aircraft take-off?   |
|  | 10. How should the oleo strut unit of a landing gear be designed?<br>$PART B - (5 \times 13 = 65 \text{ marks})$  |
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|  | 11. (a) (i) State the aim of the project feasibility study phase of the aircraft design process. Discuss the work that is carried out in this phase.(6)   |
|  | (ii) Following the preliminary design stage of an aircraft, detailed<br>design studies are carried out. Explain the objectives and different<br>phases involved in the detailed design phase. (7) |
|  | Or  |

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#### PART C — $(1 \times 15 = 15 \text{ marks})$

- (a) (i) Define the static margin of an aircraft and explain its role in aircraft design. (5)
  - (ii) Write about aircraft lateral stability and explain design requirements for adequate lateral stability. Explain vertical tail sizing of an aircraft with respect to lateral stability. (10)

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(b) A regional transport airplane with turboprop engine has the following specifications: (15)

No. of passengers: 60

V<sub>cruise</sub>: 520 kmph at around 4 km altitude

Safe range: 1300 km

For this aircraft, write about how the following parameters are selected/optimised: Airfoil type, wing span, wing sweep, wing chord at root and tip, aspect ratio, dihedral angle, power plant rating, operational empty weight, maximum fuel weight, diving speed and maximum rate of climb.

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