CBCS SCHEME

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21AE52

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Aircraft Propulsion

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Briefly discuss the principle of Aircraft propulsion and classify the different types of aircraft power plants. **(10 Marks)**

b. Write the comparision between gas turbine engines over reciprocating engine. **(10 Marks)**

OR

2 a. Explain the working principle of 4-stroke CI engine using PV and TS diagram. **(10 Marks)**

b. What are the various components of an IC Engines? Explain with neat sketch their functional importance. **(10 Marks)**

Module-2

3 a. Discuss different types of propellers and write the propeller nomenclature with neat sketch. **(10 Marks)**

b. Derive the expression for momentum theory for a propeller with suitable assumptions. **(10 Marks)**

OR

4 a. Illustrate with neat sketch of Turbofan engine. What are the advantages and disadvantages of the engine? **(10 Marks)**

b. Define thrust and derive thrust equation for a propulsive device. **(10 Marks)**

Module-3

5 a. List the purpose of inlets in gas turbine engines. Briefly explain subsonic inlets. **(10 Marks)**

b. Obtain a relation for minimum area ratio (Amax/Ai) in terms of external deceleration and co-efficient of pressure. **(10 Marks)**

OR

6 a. With the help of relevant sketches, describe the process of shock swallowing by area variation. **(10 Marks)**

b. Elaborate with neat sketch, under expanded and over expanded nozzles. **(10 Marks)**

Module-4

7 a. Explain the process of surging and choking in centrifugal compressor. **(10 Marks)**

b. Define degree of reaction. Derive an expression for same with usual notations. **(10 Marks)**

OR

8 a. Describe the essential parts of axial flow compressor with a neat sketch. Explain the principle of operation. **(10 Marks)**

b. Discuss the following with relevant sketches :

(i) Surging and Stall of axial flow compressor.

(ii) Vaneless and Vaned diffuser. **(10 Marks)**

Module-5

9 a. With the help of a neat sketch, explain the combustion chamber geometry. Also explain the different zones of combustion. **(10 Marks)**

b. Explain different types of combustion chambers used in gas turbine engine. List their advantages and disadvantages. **(10 Marks)**

OR

10 a. Illustrate the different methods used for turbine blade cooling with relevant sketches. **(10 Marks)**

b. Explain the different methods of fixing of blades to the turbine discs in a gas turbine. **(10 Marks)**

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