R09

Code No: 58097

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, April - 2018
AEROELASTICITY
(Aeronautical Engineering)

Time: 3 Hours **Max. Marks: 75**

Answer any Five Questions
All Questions Carry Equal Marks
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1.a) Explain the influence of aeroelastic phenomenon on design of structural members.
b) Write a short note on the following dynamic aeroelastic problems:
i) Unsteady airload
ii) Inertia force. [7+8]

2. Derive the Fredholm integral equations of second kind. Also explain the field of application. [15]

3. State Hamilton's principle and obtain the governing equation of motion of bending vibration of uniform simply supported beam of length 'l' and constant EI. [15]

4. Write a short note on the following aeroelastic phenomena:
a) Loss of aileron control
b) Wing anhedral divergence
c) Stall flutter. [15]

5.a) What is flutter instability in aircraft wings? Describe briefly the objective and approach of the classical flutter analysis.
b) Illustrate the procedure to conduct the dimensional similarity analysis for determining the drag on a thin rectangular plate placed normal to a fluid with velocity, V. [8+7]

6. Derive Quasi-steady aerodynamic derivatives for an unsteady flow over a two dimensional airfoil. [15]

7.a) What are the different methods of flutter prevention? Explain any two methods with suitable examples.
b) Derive the equation that shows the effects of structural parameters of the wing on the critical speed of the torsion- flexure flutter. [7+8]

8.a) Describe an approximate method to determining natural frequencies and mode shapes of a simply supported beam of arbitrary mass distribution undergoing flexural vibrations.
b) What are the various aeroelastic problems encountered during flight? [8+7]

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