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Question Paper Code : 52535

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Sixth Semester

Aeronautical Engineering

AE 6602 – VIBRATIONS AND ELEMENTS OF AEROELASTICITY

(Regulation 2013)

Time : Three hours

Maximum : 100 marks

(Tables and Charts to be permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State D' Alembert's Principle.
2. What is Simple Harmonic Motion?
3. Sketch 'Static Coupling'.
4. State the 'Hamilton's Principle'.
5. Define String Vibration.
6. Explain longitudinal vibration of rod.
7. List down various approximate methods used in vibration analysis.
8. State the basis of Rayleigh's Method.
9. What is 'Buffeting'?
10. Explain the term 'Flutter' occurring in aircraft.

PART B — (5 × 13 = 65 marks)

11. (a) Draw the diagram of free vibrations with viscous damping and derive the governing equation.

Or

- (b) Explain the operation of frequency measuring instrument 'Frahman's Reed Tachometer'.

12. (a) Explain 'Vibration Absorber'.

Or

- (b) Derive the differential equation for a two degree system.

13. (a) Derive the equation using 2nd law of Newton for 'Torsional Free Vibration System' with one degree of freedom.

Or

- (b) Derive the governing equation for longitudinal vibration of a bar and use the same to find the natural frequency of vibration of bar of length L and uniform section with its ends fixed.

14. (a) Considering Rayleigh method derive the expression for natural frequency of vibration of beam. Using the same obtain the natural frequency of vibration of a simply supported beam of length L and uniform section. Assume displacement expression in trigonometric function forms.

Or

- (b) Briefly explain the use of Dunkerley's formula to find the fundamental frequency of a system. Using Dunkerley's formula obtain the fundamental frequency of the system shown in Fig.14(b).

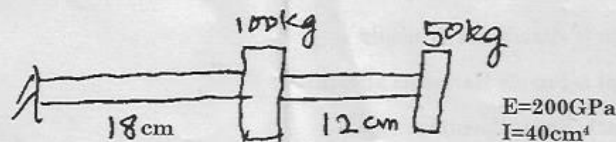


Fig.14(b)

15. (a) Describe the factor 'Wing Divergence'.

Or

- (b) Describe the Phenomenon known as 'Aileron Reversal'.

PART C — (1 × 15 = 15 marks)

16. (a) Discuss the economic factors pertaining to the design on the construction of aircraft.

Or

- (b) Analyse the engineering factors regarding the design of the aircraft.