

1. Justify the following

- a) **Flutter is different from forced vibrations.**
- b) **Flap-lag flutter is a unique aeroelastic instability with rotor blades, and it has nothing to do with fixed wing.**
- c) **Flap-lag flutter is a weak instability and can be easily stabilized.**
- d) **Soft lag rotors get stabilized with a small elastic coupling**
- e) **Pitch divergence of the blades does not depend on the elastic axis position.**
- f) **Through a simple analysis, the blade was found to be unstable from pitch-flap instability and the flutter frequency was calculated to be 18Hz. During the hover test, the rotor model was found to be quite stable at the operating speed of 360 RPM. However, when the speed was slightly reduced, an instability appeared and the rotor started shaking violently.**
- g) **After the blade was built, the analysis showed the possibility of pitch-flap flutter. You would like to do some quick fix to the problem.**
- h) **How would you identify the wake excited flutter? Suggest ways to get rid of it.**
- i) **A great effort is made to keep the cg and the elastic axis at the quarter-chord position.**
- j) **Through a quasielastic torsion modelling, the important pitch-flap and pitch-lag terms are retained.**
- k) **The pitch divergence of the blades does not depend on the thrust level at which the rotor is being operated.**