5th Semester	RAE5D005	Helicopter Engineering	L-T-P 3-0-0	3 CREDITS

COURSE OUTCOMES

1. To perform the Aerodynamics calculation of Rotor blade
2. To perform stability and control characteristics of Helicopter
3. To perform and control Rotor vibration
4. Apply Momentum and simple blade element theories to helicopter's rotor blades.
5. Analyze the power requirements in forward flight and associated stability problems of helicopter.

Module-1 Elements of Helicopter Aerodynamics

Configurations based on Torque reaction – Jet rotors and compound helicopters – Methods of Control, rotor blade pitch control, –Collective pitch and and Cyclic pitch – Lead – Lag and flapping hinges

Module-2 Ideal Rotor Theory

Hovering performance – Momentum and simple blade element theories – Figure of merit – Profile and induced power estimation – Constant Chord and ideal twist rotors.

Module-3 Power Estmation

Induced, profile and parasite power requirements in forward flight – Performance curves with effects of altitude – Preliminary ideas on helicopter stability.

Module-4 Control of V/STOL Aircraft

Various configurations – propeller, rotor, ducted fan and jet lift – Tilt wing and vectored thrust –Performance of VTOL and STOL aircraft in hover, transition and forward motion.

Module-5 Ground Effect

Types – Hover height, lift augmentation and power calculations for plenum chamber and peripheral jet machines – Drag of hovercraft on land and water –Applications of hovercraft.

Books

1. Gessow, A.and Myers, G. C., Aerodynamics of Helicopter, MacMillan & Co., 1987.

2. Gupta, L., Helicopter Engineering, Himalayan Books, 1996.

3. Johnson, W., Helicopter Theory, Princeton University Press, 1980.

4. MacCromick, B. W., Aerodynamics of V/STOL Flight, Academic Press, 1987.