Model Question Paper -1 with effect from 2020-21(CBCS Scheme)

USN | | | | | | | | | | |

Fifth Semester B.E. Degree Examination

FLIGHT MECHANICS

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

			Marks
		Module – 1	
Q.1	**(a)**	With a neat sketch explain forces & moments of an aircraft in the plain of symmetry.	10
	(b)	Derive an expression for Cmcg for an aircraft	10
		OR	
Q.2	**(a)**	With a explain steady state performance of an aircraft	10
	(b)	Write a note on contribution of airframe components for longitudinal stability.	10
		Module – 2	
Q.3	**(a)**	Explain the estimation of hinged moment parameter for longitudinal stability	10
	(b)	Write a note on stick free gradient in un accelerated flight.	10
		OR	
Q.4	**(a)**	Discuss about the difference between stick fixed & stick free condition for longitudinal stability.	4
	(b)	Derive an expression for neutral point of static longitudinal stability.	12
	(c)	Write a note on trim tabs	4
		Module – 3	
Q.5	**(a)**	Derive an expression for contribution of airframe component of directional stability.	12

	(b)	Obtain the minimum control speed in the event of an engine failure for the following airplane. $S=65m^2$, $Sv=6.5\ m^2$, $Lv=10.5M$, BHP=880KW , Propeller efficiency=75%, $Yp=4.5M$, $(dC_{Lv}/d\delta v)=0.02/deg$,$(\delta r)max=25\%$.	8
OR			
Q.6	**(a)**	Derive an expression for estimation of Dihedral effect for lateral stability	10
	(b)	Explain the estimation of lateral control power of an aircraft.	10
Module – 4			
Q.7	**(a)**	Discussed about gravitational and thrust velocity equation of a flight.	10
	(b)	Why deflecting the aileron produce a yawing moment, explain with a neat sketch.	10
OR			
Q.8	**(a)**	Explain small perturbation theory & its equation of motion.	10
	(b)	Explain the following i) Pitching velocity ii) Time rate of change of an angle of attack.	5 5
Module – 5			
Q.9	**(a)**	Explain Phegoid & short period of motion for dynamic longitudinal stability	10
	(b)	Examine the two potential cases where the Routh method breaks down as follows, (a) $\lambda^5 +\lambda^4 +3\lambda^3 +3\lambda^2 +4\lambda+6=0$ (b) $\lambda^6 +3 \lambda^5 +6 \lambda^4 +12 \lambda^3+11 \lambda^2+9 \lambda +6=0$.	10
OR			
Q.10	**(a)**	Determine whether the characteristic equation given below have stable or unstable. (a)$2\lambda^3+ 6\lambda^2+8 \lambda+8=0$ (b)$2\lambda^3+16 \lambda^2+4 \lambda+12=0$ (c)$A\lambda^4+B\lambda^3+C \lambda^2+D\lambda+E=0$.	10
	(b)	With a neat sketch explain the Dutch roll and spiral mode of an aircraft.	10

Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome

Question		Bloom's Taxonomy Level attached	Course Outcome	Programme Outcome
Q.1	(a)	L2	CO1	PO1,PO3,,PO12
	(b)	L2	CO1	PO1,PO3,,PO12
Q.2	(a)	L2	CO1	PO1,PO3,,PO12
	(b)	L2	CO1	PO1,PO3,,PO12
Q.3	(a)	L2	CO2	PO1,PO3,,PO12
	(b)	L2	CO2	PO1,PO3,,PO12
Q.4	(a)	L2	CO2	PO1,PO3,,PO12
	(b)	L2	CO2	PO1,PO3,,PO12
	(c)	L2	CO2	PO1,PO3,,PO12
Q.5	(a)	L2	CO2	PO1,PO3,,PO12
	(b)	L3	CO2	PO1,PO2,
Q.6	(a)	L2	CO2	PO1,PO3,,PO12
	(b)	L2	CO2	PO1,PO3,,PO12
Q.7	(a)	L2	CO3	PO1,PO3,,PO12
	(b)	L2	CO3	PO1,PO3,,PO12
Q.8	(a)	L2	CO3	PO1,PO3,,PO12
	(b)	L2	CO3	PO1,PO3,,PO12
Q.9	(a)	L2	CO3	PO1,PO3,,PO12
	(b)	L3	CO3	PO1,PO2,
Q.10	(a)	L3	CO3	PO1,PO2,
	(b)	L2	CO3	PO1,PO3,,PO12

Bloom's Taxonomy Levels	**Lower order thinking skills**		
	Remembering(knowledge): L_1	Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills		
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6

Model Question Paper -2 with effect from 2020-21(CBCS Scheme)

USN | | | | | | | | | | |

Fifth Semester B.E. Degree Examination

FLIGHT MECHANICS

TIME: 03 Hours **Max. Marks: 100**

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

		Module – 1	**Marks**
Q.1	**(a)**	With a relevant graph, explain atmosphere and International standard atmosphere of an aircraft.	10
	(b)	Derive an expression for (dcm/dcl) for various parts of an aircraft.	10
		OR	
Q.2		Explain power effect on static longitudinal stability of an aircraft.	20
		Module – 2	
Q.3	**(a)**	Discussed about hinged parameter for longitudinal stability for stick-free condition.	10
	(b)	Explain about restriction of aft C.G	5
	(c)	Write a note on trim tabs	5
		OR	
Q.4	**(a)**	Briefly explain about floating characteristics and aerodynamic balance of static longitudinal stability.	10
	(b)	Derive an expression for neutral point of static longitudinal stability.	10
		Module – 3	
Q.5	**(a)**	Derive an expression for stick-free directional stability of a flight.	10

	(b)	Discussed about rudder effect and dorsal fin.	10
		OR	
Q.6	**(a)**	Explain the following i)swept wing ii)flaps iii)one engine inoperative condition	 4 4 4
	(b)	Obtain the minimum control speed in the event of an engine failure for the following airplane. $S=65m^2$, $Sv=6.5\ m^2$, Lv=10.5M, BHP=880KW , Propeller efficiency=75%, Yp=4.5M, $(dC_{Lv}/d\delta v)=0.02$/deg,$(\delta r)max=25\%$.	8
		Module – 4	
Q.7	**(a)**	Derive an expression of rigid body equations of motion	20
		OR	
Q.8	**(a)**	Explain small perturbation theory & its equation of motion.	10
	(b)	Explain the following i)Rolling rate ii)Yawing rate	 5 5
		Module – 5	
Q.9	**(a)**	Explain the derivative for roll-yaw coupling.	10
	(b)	Examine the two potential cases where the Routh method breaks down as follows, (a) $\lambda^5 + \lambda^4 + 3\lambda^3 + 3\lambda^2 + 8\lambda + 6 = 0$ (b) $\lambda^6 + 5\lambda^5 + 6\lambda^4 + 12\lambda^3 + 11\lambda^2 + 9\lambda + 6 = 0$.	10
		OR	
Q.10	**(a)**	Discussed about auto rotation and spin of an aircraft.	10
	(b)	Determine whether the characteristic equation given below have stable or unstable. (a)$\lambda^3 + 6\lambda^2 + 12\lambda + 8 = 0$ (b)$2\lambda^3 + 4\lambda^2 + 4\lambda + 12 = 0$ (c)$A\lambda^4 + B\lambda^3 + C\lambda^2 + D\lambda + E = 0$.	10

Table showing the Bloom's Taxonomy Level, Course Outcome and Programme Outcome

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Q.1	(a)	L2	CO1	PO1,PO3,,PO12
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	(b)	L2	CO1	PO1,PO3,,PO12
Q.3	(a)	L2	CO2	PO1,PO3,,PO12
	(b)	L2	CO2	PO1,PO3,,PO12
	(c)	L2	CO2	PO1,PO3,,PO12
Q.4	(a)	L2	CO2	PO1,PO3,,PO12
	(b)	L2	CO2	PO1,PO3,,PO12
Q.5	(a)	L2	CO2	PO1,PO3,,PO12
	(b)	L2	CO2	PO1,PO3,,PO12
Q.6	(a)	L2	CO2	PO1,PO3,,PO12
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Q.7	(a)	L2	CO3	PO1,PO3,,PO12
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	(b)	L2	CO3	PO1,PO3,,PO12
Q.9	(a)	L2	CO3	PO1,PO3,,PO12
	(b)	L3	CO3	PO1,PO2,
Q.10	(a)	L2	CO3	PO1,PO3,,PO12
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Bloom's Taxonomy Levels			
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	Higher order thinking skills		
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