ANNA UNIVERSITY TIRUCHIRAPPALLI

Tiruchirappalli - 620 024

Syllabus

B.E. Aeronautical Engineering

SEMESTER III

MATHEMATICS III

(Common to all branches)

L	T	P
3	1	0

UNIT I PARTIAL DIFFERENTIAL EQUATIONS 9

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

UNIT II FOURIER SERIES 9

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identity – Harmonic Analysis.

UNIT III BOUNDARY VALUE PROBLEMS 9

Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

UNIT IV FOURIER TRANSFORM 9

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

UNIT V Z –TRANSFORM AND DIFFERENCE EQUATIONS 9

Z-Transform – Elementary properties – Inverse Z-Transform – Convolution theorem – Formation of difference equations – Solution of difference equations using Z-Transform.

L: 45 T: 15 Total: 60

TEXT BOOK

1. Grewal B.S., "Higher Engineering Mathematics", Fortieth Edition, Khanna Publishers, 2007.

REFERENCES

1. Churchill R.V. and Brown J.W., "Fourier Series and Boundary Value Problems", Fourth Edition, McGraw-Hill Book Co., 1987.
2. Veerarajan .T, "Engineering Mathematics III", Third edition, Tata McGraw-Hill Education, 2007.
3. Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics Volume III", S. Chand & Company ltd., 1996.

PRODUCTION TECHNOLOGY

L	T	P
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(Common to Aeronautical / Automobile / Production)

UNIT I LATHE **9**

Lathe – specification of a Lathe – block diagram – functions of each part – work holding devices – Various operations performed in Lathe – facing – turning – chamfering – and knurling – relative positions of tool and job – Taper turning operations (three methods) – thread cutting – thread – RH and LH – single start and multi start with application.

UNIT II SHAPER, PLANER AND SLOTTER **9**

Shaper, planner and slotter – Block diagram, specification, working principles – functions of various parts – work and tool holding devices – operations carried out – quick return mechanism, mechanical and hydraulic cross feed mechanism – Comparison of shaping with slotting – simple problems to calculate the velocity – speed, feed and depth of cut.

UNIT III DRILLING **9**

Drilling machines – block diagram – specifications – types –portable – bench – sensitive – radial arm – gang – multiple and upright – functions of parts – work holding devices and operations. Relative operations – reaming – boring – tapping – counter boring – counter sinking – trepanning and spot facing – Torque calculations.

UNIT IV MILLING **9**

Milling machines – up and down milling – classification of milling machines – slot, Horizontal and vertical milling machines – block diagram – functions of each part – applications – Gear cutting using milling machine – Milling cutters – peripheral, face, end, T slot and form etc – Indexing mechanism – methods of indexing – direct – plain – compound and differential indexing – problems

UNIT V GRINDING **9**

Grinding machines types – surface – cylindrical – centreless – block diagrams – specifications – functions of each parts – comparisons – applications – Grinding wheel – types – specifications – selection – Balancing – dressing – loading and turning of wheel – special grinding machines

Total: 45

TEXT BOOKS

1. P.C. Sharma, “A Text Book of Production Technology”, S. Chand and Company, 2003
2. W.A.J. Chapman, “Workshop Technology Part I and II”, Oxford and IBH Publishers, 1990

REFERENCES

1. R.K. Jain, “Production Technology”, Khanna Publishers, 1998
2. HMT Bangalore, “Production Technology”, Tata McGraw-Hill Publishing Company Limited, 1990
3. Hajra Choudhary etal, “Elements of Production Technology – Vol. II”, Asia Publishing House, 2001

AERO ENGINEERING THERMODYNAMICS

L	T	P
3	1	0

UNIT I BASIC THERMODYNAMICS 12

Systems – Zeroth Law – First Law – Heat and work transfer in flow and non-flow processes – Second law – Kelvin – Planck statement – Clausius statement – Concept of entropy – Clausius inequality – Entropy change in non-flow processes.

UNIT II AIR CYCLES 8

Otto – Diesel – Dual combustion and Brayton combustion cycles – Air standard efficiency – Mean effective pressure – Actual and theoretical PV diagrams of four stroke and two stroke IC Engines.

UNIT III THERMODYNAMICS OF ONE DIMENSIONAL FLUID FLOW 8

Application of Continuity and energy equations – Properties of steam – Rankine cycle – Isentropic flow of ideal gases through nozzles – Simple jet propulsion system – Thrust rocket motor – Specific impulse.

UNIT IV REFRIGERATION AND AIR CONDITIONING 8

Principles of refrigeration – Air conditioning – Heat pumps – Vapour compression – Vapour absorption types – Coefficient of performance – Properties of refrigerants

UNIT V AIR COMPRESSORS 9

Classification and working principle – work of compression with and without clearance – Isothermal and Isentropic efficiency of reciprocating air compressors – multistage compression and inter-cooling – Various types of compressors (Descriptive treatment only)

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Yunus A.Cengal., “Thermodynamics an Engineering Approach”, Third Edition, Tata McGraw-Hill Co. Ltd., 2002.
2. Rathakrishnan, E., “Fundamentals of Engineering Thermodynamics”, Prentice–Hall, India, 2000.

REFERENCES

1. Nag. P.K., “Engineering Thermodynamics”, Tata McGraw–Hills Co., Ltd., Seventh Edition, 1993
2. Mayhew, A. and Rogers, B., “Engineering Thermodynamics”, E.L.B.S. Edition, Longman Green & Co. Ltd., 1990.
3. Van Wylen, G.J. and Sonntag, R.E., “Fundamentals of Classical Thermodynamics (S.I.Version)”, Second Edition, 1986.

FLUID MECHANICS AND MACHINERY

L	T	P
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(Common to Aeronautical / Automobile / Mechanical / Production)

UNIT I BASIC CONCEPTS AND PROPERTIES 7

Fluid – definition – distinction between solid and fluid – Units and dimensions – Properties of fluids – density – specific weight – specific volume – specific gravity – temperature – viscosity – compressibility – vapour pressure – capillary and surface tension – Fluid statics: concept of fluid static pressure – absolute and gauge pressures – pressure measurements by manometers and pressure gauges.

UNIT II FLIUD KINEMATICS AND FLUID DYNAMICS 10

Fluid Kinematics – Flow visualization – lines of flow – types of flow – velocity field and acceleration – continuity equation one and three dimensional differential forms – Equation of streamline – stream function – velocity potential function – circulation – flow net – fluid dynamics – equations of motion – Euler's equation along a streamline – Bernoulli's equation – applications – Venturi meter – Orifice meter – Pitot tube – dimensional analysis – Buckingham's π theorem – applications – similarity laws and models.

UNIT III INCOMPRESSIBLE FLUID FLOW 10

Viscous flow – Navier-Stoke's equation (Statement only) – Shear stress – pressure gradient relationship – laminar flow between parallel plates – Laminar flow through circular tubes (Hagen poiseulle's) – Hydraulic and energy gradient – flow through pipes – Darcy – Weisback's equation – pipe roughness –friction factor – Moody's diagram – minor losses – flow through pipes in series and in parallel – power transmission – Boundary layer flows – boundary layer thickness – boundary layer separation – drag and lift coefficients.

UNIT IV HYDRAULIC TURBINES 10

Fluid machines: definition and classification – exchange of energy – Euler's equation for turbo machines – Construction of velocity vector diagrams – head and specific work – components of energy transfer – degree of reaction – Hydro turbines: definition and classifications – Pelton turbine – Francis turbine – Propeller turbine – Kaplan turbine – working principles – velocity triangles – work done – specific speed – efficiencies – performance curve for turbines.

UNIT V HYDRAULIC PUMPS 8

Pumps: definition and classifications – Centrifugal pump: classifications, working principle, velocity triangles, specific speed, efficiency and performance curves – Reciprocating pump: classification – working principle – indicator diagram – work saved by air vessels and performance curves – cavitations in pumps – rotary pumps: working principles of gear and vane pumps

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Streeter V.L., and Wylie E.B., “Fluid Mechanics”, McGraw-Hill, 1983
2. Bansal R.K., “Fluid Mechanics and Hydraulics Machines”, Fifth Edition, Laxmi publications (P) Ltd, 1995

REFERENCES

1. Vasandani, V.P., “Hydraulic Machines - Theory and Design”, Khanna Publishers,1992
2. White F.M., “Fluid Mechanics”, Fifth Edition, Tata McGraw-Hill, 2003.
3. Ramamirtham S., "Fluid Mechanics and Hydraulics and Fluid Machines", Dhanpat Rai and Sons, 1998.

SOLID MECHANICS

L	T	P
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UNIT I BASICS AND AXIAL LOADING 10

Stress and Strain – Hooke's Law – Elastic constants and their relationship – Statically determinate cases – bar with uniform and varying section statically indeterminate cases – composite bar – Thermal Stresses – stresses due to freely falling weight.

UNIT II STRESSES IN BEAMS 10

Shear force and bending moment diagrams for simply supported and cantilever beams – Bending stresses in straight beams – Shear Stresses in bending of beams with various cross sections – beams of uniform strength

UNIT III DEFLECTION OF BEAMS 10

Double integration method – McCauley's method – Area moment method – Conjugate beam method

UNIT IV TORSION 5

Torsion of circular shafts – shear stresses and twist in solid and hollow circular shafts – closely coiled helical springs.

UNIT V BI AXIAL STRESSES 10

Stresses in thin circular cylinder and spherical shell under internal pressure – volumetric Strain. Combined loading – Principal Stresses and maximum Shear Stresses – Analytical and Graphical methods

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Popov E.P, "Engineering Mechanics of Solids", Second Edition, Pearson Education, 2007.
2. Nash William, "Strength of Materials", TMH, 1998

REFERENCES

1. Timoshenko.S. and Young D.H., "Elements of strength materials Vol. I and Vol. II", T. Van Nostrand Co-Inc Princeton-N.J., 1990.
2. Dym C.L. and Shames I.H., "Solid Mechanics", 1990.

ELEMENTS OF AERONAUTICS

L	T	P
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UNIT I HISTORICAL EVALUATION 8

Early airplanes – biplanes and monoplanes – Developments in aerodynamics – materials – structures and propulsion over the years

UNIT II AIRCRAFT CONFIGURATIONS 5

Components of an airplane and their functions – Different types of flight vehicles – classifications – Conventional control – Powered control – Basic instruments for flying – Typical systems for control actuation

UNIT III INTRODUCTION TO PRINCIPLES OF FLIGHT 10

Physical properties and structure of the atmosphere – Temperature – pressure and altitude relationships – Evolution of lift – drag and moment – Aero-foils – Mach number – Maneuvers.

UNIT IV INTRODUCTION TO AIRPLANE STRUCTURES AND MATERIALS 12

General types of construction – Monocoque – semi – monocoque and geodesic construction – Typical wing and fuselage structure – Metallic and non – metallic materials – Use of aluminium alloy – titanium – stainless steel and composite materials.

UNIT V POWER PLANTS USED IN AIRPLANES 10

Basic ideas about piston – turboprop and jet engines – Use of propeller and jets for thrust production. Comparative merits – Principles of operation of rocket – types of rockets and typical applications – Exploration into space.

Total: 45

TEXT BOOKS

1. Anderson, J.D., “Introduction to Flight”, McGraw-Hill, 1995.

REFERENCE

1. Kermode, A.C., “Flight without Formulae”, McGraw-Hill, 1997.

THERMODYNAMICS LABORATORY

L	T	P
0	0	3

LIST OF EXPERIMENTS

1. Performance test on a Computerized IC Engine Test Rig
2. Valve timing of a 4 – stroke engine and port timing of a 2 stroke engine
3. Determination of effectiveness of a parallel flow heat exchanger
4. Determination of effectiveness of a counter flow heat exchanger
5. Determination of the viscosity coefficient of a given liquid
6. COP test on a vapour compression refrigeration test rig
7. COP test on a vapour compression air – conditioning test rig
8. Study of a Gas Turbine Engine.
9. Determination of Conductive Heat Transfer Coefficient.
10. Determination of Thermal Resistance of a Composite wall.

Total: 60

FLUID MECHANICS AND MACHINERY LABORATORY

L	T	P
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LIST OF EXPERIMENTS

1. Calibration of venturimeter
2. Pressure measurement with pitot static tube
3. Determination of pipe flow losses.
4. Verification of Bernoulli's theorem
5. Flow visualization by Heleshaw apparatus
6. Performance test on centrifugal pumps
7. Performance test on reciprocating pumps
8. Performance test on piston wheel turbine
9. Performance test on Francis turbine
10. Determination of Viscosity of a Fluid

Total: 45

STRENGTH OF MATERIALS LABORATORY

L	T	P
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LIST OF EXPERIMENTS

1. Hardness test – a)Vickers b) Brinell c) Rockwell d) Shore
2. Tension test
3. Torsion test
4. Impact test – a) Izod b) Charpy
5. Fatigue test – a) Reverse plate bending b) Rotating Beam
6. Testing of springs
7. Block Compression Test

Total: 45

SEMESTER IV

NUMERICAL METHODS

(Common to Aeronautical / Automobile / Mechanical / Production)

L	T	P
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UNIT I SOLUTION OF EQUATIONS AND EIGEN VALUE PROBLEMS 9

Linear interpolation methods (method of false position) – Newton's method –Solution of linear system by Gaussian elimination and Gauss – Jordon methods – iterative methods: Gauss Jacobi and Gauss-Seidel methods – Inverse of a matrix by Gauss–Jordan method – Eigen value of a matrix by power method

UNIT II INTERPOLATION AND APPROXIMATION 9

Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulae.

UNIT III NUMERICAL DIFFERENTIATION AND INTEGRATION 9

Derivatives from difference tables – Divided differences and finite differences – Numerical integration by Trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Double integrals using trapezoidal and Simpson's rules.

UNIT IV INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 9

Single step Methods: Taylor Series method – Euler's method – Modified and Improved Euler's method – Fourth order Runge-Kutta method for solving first and second order equations – Multi-step methods: Milne's and Adam's predictor and corrector methods.

UNIT V BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS 9

Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by implicit and explicit methods – one dimensional wave equation and two dimensional Laplace and Poisson equations.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. C.F. Gerald and P.O. Wheatley "Applied Numerical Analysis", Sixth Edition, Pearson Education, 2005.

REFERENCES

1. M.K. Jain, S.R.K. Iyengar and R.K. Jain, "Numerical Methods for Scientific and Engineering Computation" Fourth Edition, New Age International Publishers, 2003.
2. M.K. Venkatraman, 'Numerical Methods', National Publication Company, 1991.
3. P. Kandasamy, K. Thilakavthy and K. Gunavathy, "Numerical Methods", Second Edition, S.Chand & Co., 2003.

AERODYNAMICS I

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UNIT I REVIEW OF BASIC FLUID MECHANICS 4

Continuity – Momentum and energy equations.

UNIT II TWO DIMENSIONAL FLOWS 12

Basic flows – Source – Sink – Free and Forced vortex – uniform parallel flow – Their combinations – Pressure and velocity distributions on bodies with and without circulation in ideal and real fluid flows – Kutta Joukowski's theorem

UNIT III CONFORMAL TRANSFORMATION 10

Joukowski transformation and its application to fluid flow problems – Kutta condition – Blasius theorem.

UNIT IV AIRFOIL AND WING THEORY 12

Joukowski, Karman – Trefftz – Profiles – Thin aerofoil theory and its applications – Vortex line – Horse shoe vortex – Biot and Savart law – Lifting line theory and its limitations.

UNIT V VISCOUS FLOW 7

Newton's law of viscosity – Boundary Layer – Navier-Stokes equation – displacement – Momentum thickness – Flow over a flat plate – Blasins solution

Total: 45

TEXT BOOKS

1. Anderson, J.D., "Fundamentals of Aerodynamics", McGraw-Hill Book Co., 1985.

REFERENCES

1. Houghton, E.L., and Carruthers, N.B., "Aerodynamics for Engineering students", Edward Arnold Publishers Ltd., 1989.
2. Milne Thomson, L.H., "Theoretical Aerodynamics", Macmillan, 1985.
3. Clancey, L.J., "Aerodynamics", Pitman, 1986.

AIRCRAFT SYSTEMS AND INSTRUMENTATIONS

L	T	P
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UNIT I AIRPLANE CONTROL SYSTEMS 15

Conventional Systems – Power assisted and fully powered flight controls – Power actuated systems – Engine control systems – Push, Pull rod system – flexible push full rod system – Components – Modern control systems – Digital fly by wire systems – Auto pilot system active control Technology – Communication and Navigation systems Instrument landing systems – VOR – CCV case studies.

UNIT II AIRCRAFT SYSTEMS 7

Hydraulic systems – Study of typical workable system – components – Hydraulic system controllers – Modes of operation – Pneumatic systems – Advantages – Working principles – Typical Air pressure system – Brake system – Typical Pneumatic power system – Components – Landing Gear systems – Classification – Shock absorbers – Retractive mechanism.

UNIT III ENGINE SYSTEMS 8

Fuel systems for Piston and jet engines – Components of multi engines – lubricating systems for piston and jet engines – Starting and Ignition systems – Typical examples for piston and jet engines

UNIT IV AUXILLIARY SYSTEM 8

Basic Air cycle systems – Vapour Cycle systems – Boost – Strap air cycle system – Evaporative vapour cycle systems – Evaporative air cycle systems – Oxygen systems – Fire protection systems, Deicing and anti icing systems.

UNIT V AIRCRAFT INSTRUMENTS 7

Flight Instruments and Navigation Instruments – Gyroscope – Accelerometers, Air speed Indicators – TAS – EAS – Mach Meters – Altimeters – Principles and operation – Study of various types of engine instruments – Tachometers – Temperature gauges – Pressure gauges – Operation and Principles.

Total: 45

TEXT BOOKS

1. McKinley, J.L., and Bent, R.D., “Aircraft Maintenance & Repair”, McGraw – Hill, 1993.
2. “General Hand Books of Airframe and Power-plant Mechanics”, U.S. Dept. of Transportation, Federal Aviation Administration, The English Book Store, 1995.

REFERENCES

1. Mekinley, J.L. and Bent, R.D., “Aircraft Power Plants”, McGraw-Hill, 1993.
2. Pallet, E.H.J., “Aircraft Instruments & Principles”, Pitman & Co., 1993.
3. Treager, S., “Gas Turbine Technology”, McGraw-Hill, 1997.

MECHANICS OF MACHINES

L	T	P
3	1	0

(Common to Aeronautical / Automobile / Production)

UNIT I MECHANISMS **9**

Machine Structure – Kinematic link, pair and chain – Grueblers criteria – Constrained motion – Degrees of freedom – Slider crank and crank rocker mechanisms – Inversions – Applications – Kinematic analysis of simple mechanisms – Determination of velocity and acceleration.

UNIT II FRICTION **9**

Friction in screw and nut – Pivot and collar – Thrust bearing – Plate and disc clutches – Belt (flat and V) and rope drives – Ratio of tensions – Effect of centrifugal and initial tension – Condition for maximum power transmission – Open and crossed belt drive.

UNIT III GEARING AND CAMS **9**

Gear profile and geometry – Nomenclature of spur and helical gears – Gear trains: Simple, compound and epicylic –Determination of speed and torque – Cams – Types of cams – Design of profiles – Knife edged – flat faced and roller ended followers with and without offsets for various types of follower motions

UNIT IV BALANCING **9**

Static and dynamic balancing – Single and several masses in different planes –Balancing of reciprocating masses – primary balancing and concepts of secondary balancing – Single and multi cylinder engines – Balancing of radial V engine – direct and reverse crank method

UNIT V VIBRATION **9**

Free, forced and damped vibrations of single degree of freedom systems – Force transmitted to supports – Vibration isolation – Vibration absorption – Torsional vibration of shaft – Single and multi rotor systems – Geared shafts – Critical speed of shaft.

L: 45 T: 15 Total: 60

TEXT BOOKS

1. Rattan.S.S, “Theory of Machines”, Tata McGraw–Hill Publishing Co, 2004
2. Sadhu Singh, “Theory of Machines”, Second Edition, Pearson Education, 2006.

REFERENCES

1. Ballaney.P.L, “Theory of Machines”, Khanna Publishers, 2002
2. Rao, J.S and Dukkipati, R.V, “Mechanism and Machine Theory”, Second Edition, Wiley Eastern Ltd., 1992.
3. Malhotra, D.R and Gupta, H.C., “The Theory of Machines”, Satya Prakasam, Tech. India Publications, 1989
4. Gosh, A and Mallick, A.K., “Theory of Machines and Mechanisms”, Affiliated East West Press, 1989.

AIRCRAFT STRUCTURES I

L	T	P
3	1	0

UNIT I STATICALLY DETERMINATE STRUCTURES 10

Analysis of plane truss – Method of joints – 3D Truss – Plane frames

UNIT II STATICALLY INDETERMINATE STRUCTURES 10

Composite beam – Clapeyron's Three Moment Equation – Moment Distribution Method.

UNIT III ENERGY METHODS 10

Strain Energy due to axial, bending and Torsional loads – Castigliano's theorem – Maxwell's Reciprocal theorem – Unit load method – application to beams, trusses, frames, rings etc.

UNIT IV COLUMNS 10

Columns with various end conditions – Euler's Column curve – Rankine's formula – Column with initial curvature – Eccentric loading – South well plot – Beam column.

UNIT V FAILURE THEORY 5

Maximum Stress theory – Maximum Strain Theory – Maximum Shear Stress Theory – Distortion Theory – Maximum Strain energy theory – Application to aircraft Structural problems.

L: 45 T:15 Total: 60

TEXT BOOK

1. Donaldson, B.K., "Analysis of Aircraft Structures – An Introduction", McGraw-Hill, 1993.

REFERENCE

1. Timoshenko, S., "Strength of Materials", Vol. I and II, Princeton D. Von Nostrand Co, 1990.

CONTROL ENGINEERING

L	T	P
3	0	0

UNIT I INTRODUCTION **6**

Historical review – Simple pneumatic – hydraulic and thermal systems – Series and parallel systems – Analogies – Mechanical and electrical components – Development of flight control systems.

UNIT II OPEN AND CLOSED LOOP SYSTEMS **6**

Feedback control systems – Block diagram representation of control systems – Reduction of block diagrams – Output to input ratios – Signal flow graph.

UNIT III CHARACTERISTIC EQUATION AND FUNCTIONS **10**

Lap lace transformation – Response of systems to different inputs viz – Step input – impulse – ramp – parabolic and sinusoidal inputs – Time response of first and second order systems – steady state errors and error constants of unity feedback circuit

UNIT IV CONCEPT OF STABILITY **15**

Necessary and sufficient conditions – Routh-Hurwitz criteria of stability – Root locus and Bode techniques – Concept and construction – frequency response

UNIT V SAMPLED DATA SYSTEMS **8**

Introduction to digital control system – Digital Controllers and Digital PID Controllers

Total: 45

TEXT BOOKS

1. OGATO, “Modern Control Engineering”, Prentice-Hall of India Pvt. Ltd., 1998.
2. GOPAL. M., “Control Systems, Principles and Design”, Tata McGraw-Hill Publication, 2000.

REFERENCES

1. Azzo, J.J.D. and C.H. Houpis, “Feed back control system analysis and synthesis”, Third Edition, McGraw-Hill International,1998.
2. Kuo, B.C., “Automatic control systems”, Prentice-Hall of India Pvt. Ltd., 1998.
3. Houpis, C.H. and Lamont, G.B., “Digital Control Systems”, McGraw-Hill Book Co., 1995.

AERODYNAMICS LABORATORY

L	T	P
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LIST OF EXPERIMENTS

1. Calibration of subsonic wind tunnel.
2. Pressure distribution over smooth and rough cylinder.
3. Pressure distribution over symmetric airfoils.
4. Pressure distribution over cambered airfoils & thin airfoils
5. Force measurement using wind tunnel balance.
6. Flow over a flat plate at different angles of incidence
7. Flow visualization studies in low speed flows over cylinders
8. Flow visualization studies in low speed flows over airfoil with different angle of incidence
9. Calibration of supersonic wind tunnel.
10. Supersonic flow visualization with Schlieren system.

Total: 45

AIRCRAFT STRUCTURES LABORATORY I

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LIST OF EXPERIMENTS

1. Determination of Young’s modulus of steel using mechanical extensometers.
2. Determination of Young’s modulus of aluminum using electrical extensometers
3. Determination of fracture strength and fracture pattern of ductile materials
4. Determination of fracture strength and fracture pattern of brittle materials
5. Stress Strain curve for various engineering materials.
6. Deflection of beams with various end conditions.
7. Verification of Maxwell’s Reciprocal theorem & principle of superposition
8. Column – Testing
9. South – well’s plot.
10. Riveted Joints.

Total: 45

DESIGN AND DRAFTING

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LIST OF EXERCISES

1. Design of riveted joints (Lap joint).
2. Design of riveted joints (Butt joint with single and double straps).
3. Design of welded joints.
4. Layout of typical wing structure.
5. Layout of typical fuselage structure.
6. Computer aided modeling of typical aircraft wing.
7. Computer aided modeling of typical fuselage structure.
8. Computer aided modeling of landing gear
9. Three view diagram of a typical aircraft
10. Layout of control systems

Total: 45