SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with "A" Grade by NAAC
Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai - 600 119.
Phone: 044 - 2450 3150 / 51 / 52 / 54 / 55 Fax: 044 - 2450 2344
www.sathyabama.ac.in

SAE1102	AIRCRAFT PRODUCTION TECHNIQUES (For Aeronautical)	L	T	P	Credits	Total Marks
		3	0	0	3	100

COURSE OBJECTIVES

To get proper understanding about the aircraft component manufacturing techniques casting, welding, machining, metal forming, power metallurgy etc.

COURSE OUTCOMES

CO1: Functions of common aircraft tools utilized for non-precision and precision measurements.
CO2: Apply the machining process of different lathes and special purpose lathes.
CO3: Build the aircraft parts under milling and drilling machines.
CO4: Assess the different types of welding techniques followed for aircraft parts assembly.
CO5: Compare the types of surface finishing works handled for aircraft sheets and components.
CO6: Distinguish the protective coating techniques used for aircraft components.

UNIT 1 AIRCRAFT GENERAL ENGINEERING TOOLS & MEASUREMENTS 9 Hrs.

Tools, Classification, Basic, detail and assembly tools - Interchangeability. Hand tools - precision instruments - special tools and equipment in an airplane maintenance shop - identification terminology -specification and correct use of various aircraft hardware i.e., nuts, bots, rivets and screws etc., - American and British system of specification - threads, gears, bearings etc., Drills, taps and reamers. Identification of all types of fluid line fittings. Materials, metallic and non-metallic. Common aircraft tools, vice, hammers, chisels, files, hacksaw, marking tools-surface plate, scriber, punch, v - block, angle plate, tri-square; marking out; tools-inspection, maintenance & safety precautions. Linear measurements – non precision & precision instruments; Angular measurements - non precision & precision instruments; Taper measurements, surface measurements & Gauges.

UNIT 2 LATHE AND SPECIAL PURPOSE LATHES 7 Hrs.

Centre lathe, constructional features, cutting tool, geometry, various operations, taper turning methods, thread cutting methods; capstan and turret lathes; Automats – single spindle, multi spindle, automatic screw type.

UNIT 3 CONVENTIONAL MACHINE TOOLS 7 Hrs.

Reciprocating machine tools; shaper, planer, slotter – Milling; types, milling cutters – Hole making; drilling – reaming, boring, taping.

UNIT 4 FABRICATION AND METAL JOINING PROCESS 11 Hrs.

Casting; types of pattern, pattern material, pattern allowance, types of moulding, sand, defects in casting – welding; gas & arc welding, equipment used, flame characteristics, filler, flux materials – soldering and brazing – rivets; purpose, types, classification, riveting tools.

UNIT5 SURFACE FINISHING AND PROTECTIVE COATING 11 Hrs.

Grinding process; cylindrical grinding, surface grinding, center less grinding – honing, lapping, super finishing, polishing, buffing and hobbing. Metallic Coatings; electro plating, galvanizing, tin coating, anodizing.Organic Finishes; primers, oil paint, brushing, spraying and rubber base coatings.

Max. 45 Hours

TEXT / REFERENCE BOOKS

1. Khanna. O.P. Lal. M., Production Technology – Dhanpat Rai Publication, New Delhi, 1997.
2. Champman W.A.J., Production Technology, 4th Edition, Arnold Publisher, New Delhi, 1994.
3. HajraChoudhury S.K. Elements of Workshop Technology, Vol.1 & 2, Media Promoters & Publisher Pvt Ltd. Mumbai,
4. Keshu, S.C., Ganapathy K.K., Aircraft Production Techniques – Interline Publishing House, Bangalore.

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QUALITYSYSTEM CERTIFICATION DNV·GL ISO 9001:2015

SAE1203	INTRODUCTION TO AERODYNAMICS	L	T	P	Credits	Total Marks
	(For Aeronautical)	3	1	0	4	100

COURSE OBJECTIVES

- To Study the applications of the conservation laws to flow through pipes and hydraulic machines.
- To understand the importance of dimensional analysis.
- To understand the importance of various types of low in pumps and turbines.
- To understand the properties of basic flows.

COURSE OUTCOMES

CO1: Estimate the applications of fluid flow governing equations through the identification of fluid properties.
CO2: Illustrate the fluid flow problems theoretically through dimensional analysis and losses in pipes.
CO3: Compile the combinations of elementary flow models utilized for solving the practical flow problems.
CO4: Solve the boundary layer problems for streamlined and bluff bodies.
CO5: Discriminate the types of pumps and its performance curves.
CO6: Distinguish the different types of hydraulic turbines and its characteristics.

UNIT 1 FLUID PROPERTIES & EQUATIONS OF MOTION 14 Hrs.

Properties of fluids–Specific gravity, specific weight, viscosity, compressibility, vapor pressure and gas laws – capillarity and surface tension. Flow characteristics: concepts of system and control volume. Application of control volume to continuity equation, energy equation, momentum equation and Bernoulli's principle and its applications– Orifice meter, venturimeter, pitot –tube.

UNIT 2 DIMENSIONAL ANALYSIS AND FLUID FLOW IN CLOSED CONDUICTS 13 Hrs.

Dimensional Analysis -, Buckingham Pi - theorem, Derivations and applications of important dimensionless numbers, basic modeling and similitude.Types of flow - velocity field and acceleration. Viscous fluid flow - Laminar and turbulent flow . Hagen - Poiseuille flow in circular pipes, Development of flow in pipes, Pipe friction, Darcy-Weisbach equation and chezy's formula, Pipe losses - Major and Minor losses - Problems of parallel, series and branched pipes.

UNIT3 DYNAMICS 11 Hrs.

Equation of streamline, Stream function, velocity potential, relation between stream function and velocity potential, circulation. Basic elementary flows–Source, sink, free and forced vortex, uniform parallel flow and their combinations, pressure and velocity distributions on bodies with and without circulation in ideal and real fluid flows. Magnus effect, D'Alembertz paradox and Karman vortex street.

UNIT 4 FLUID FLOW OVER BODIES 11 Hrs.

Evolution of Lift, Drag and Moment, types of wing planforms, aerodynamic characteristics of Airfoils, concept of boundary layer, Mach Number, Maneuvers.Boundary layer theory-boundary layer development on a flat plate, displacement thickness, momentum thickness, Energy thickness, momentum integral equation, drag on flat plate- Nature of turbulence, Separation of flow over bodies- stream lined and bluff bodies, Lift and Drag on cylinder and Aero foil

UNIT5 PUMPS AND TURBINES 11 Hrs.

Impact of jets Centrifugal Pumps: Definition–Operations–VelocityTriangles–Performancecurves–Cavitations– Multistaging. Hydraulic Turbines: Classification of hydraulic turbines – Working principle of Pelton wheel, Francis and Kaplan turbines –velocity triangles –draft tube–hydraulic turbine characteristics.

Max.60 Hours

TEXT / REFERENCE BOOKS

1. Bansal.R.K,". Fluid Mechanics & Hydraulics Machines", 9th Edition, Laxmi Publications, 2005
2. Kumar, K.L., Fluid Mechanics, 2nd Edition, Tata McGraw-Hill, New Delhi,2000.
3. Irving H. Shames, Fluid Mechanics, 3rd Edition, McGraw-Hill.
4. Robert W. Fox and Alan T. McDonald, Introduction to Fluid Mechanics, 5th Edition, John Willey and Sons, Inc., U.K.
5. Douglas. J. F., Gasiorek. J. M., Swaffield. J. A., "Fluid Mechanics ELBS", 4th Edition, Prentice Hall,2000.