DEPARTMENTOFAERONAUTICALENGINEERING

COURSECOVERAGESUMMARY

FOR

IIBTECH–
ISEMESTER(2024-25)

COURSECOVERAGESUMMARY

FOR

AIRCRAFTPRODUCTIONTECHNOLOGY

IIBTECH–ISEMESTER
(2024-25)

AIRCRAFTPRODUCTIONTECHNOLOGY
(R20A2105)
COURSECOVERAGESUMMARY

Unit	Title of theunit	Topicsoftheunit	Name of the textbook	Chapter No.	PageNo.
Unit-1	Castingand Welding Techniques	Various molding processemployedin aircraft industry, Typesof patterns, Casting Process involved in Sand casting, die-casting, centrifugal casting, investment casting and shellmolding.	Manufacturing Engineering and Technologyby Kalpajikau-Addison Wesley	11	258-285
		WorkingPrinciples andequipmentused withemerging trends inarcwelding,gas welding,resistance welding,Laser welding,Soldering and brazingtechniques.		30	865- 880
Unit-2	Machining and Forming	Classificationof machiningprocesses, Typesofchips, working principles (withschematic diagramonly), types-lathe,shaper,milling machines,grinding (designationof grindingwheel), drillingm/c,CNC machining(overview of G-Codes,M-Codes).	Manufacturing Engineeringand Technologyby Kalpajikau - AddisonWesley	23	615-681
		Sheetmetal			

		operations-shearing, punching, super plastic		16	381-421
		forminganddiffusion bonding.Bending, Automationinbend forminganddifferent operationsin bending likestretchforming, spinning,drawingetc.			
Unit-3	Unconven tional Machin ing	Principles of workingand applicationsof abrasivejet machining, ultrasonicmachining, electronbeam,EDM,	Manufacturing Engineeringand Technology by Kalpajikau - AddisonWesley	27	759-779
		EBM,andplasmaarc machining,Waterjet machining,Ionbeam machining.			
Unit-4	Heat Treatment andSurface Finishing	Heattreatment of Aluminum alloys, titaniumalloys,steels, casehardening. Corrosion prevention, protective treatmentfor aluminum alloys,steels, anodizing oftitaniumalloys, organiccoating,and thermalspray coatings.	Manufacturing Engineeringand Technologyby Kalpajikau - AddisonWesley	4	100-125
Unit-5	Jigs &Fixtur es	Jigs,fixtures,stagesof assembly,types andequipmentfor riveted joints,boltedjoints (only).	Manufacturin gTechnology, Vol.II by Rao	15	15.1– 15.34
		AircraftTooling			

		Concepts.-typesof toolsusedinA/C industry.			
		NDTandOther Inspection Techniques: comparisonofNDT& DT,processinvolved in Dye PenetrateTest,X-ray, andmagneticparticle andultrasonic testing.	Manufacturin gTechnology, Vol.II by Rao	5	5.19–5.21

COURSECOVERAGESUMMARY

FOR

ELEMENTSOFAERONAUTICAL ENGINEERING

IIBTECH–ISEMESTER
(2024-2025)

ELEMENTSOFAERONAUTICALENGINEERING (R20A2104) COURSECOVERAGESUMMARY

UnitNo	TitleoftheUnit	TopicsoftheUnit	NameofThe TextBook	ChapterNo	Page No
I	**Historyandfirst principles of flight**	EvolutionofFlight-Hotair balloons, Airships Heavierthanair,Wrightflyerto commercial transportation Rotorcraft, missiles	Duchene,Flight Without Formulae	1	1-16
		Standard atmosphere, Understanding space-environment	Anderson, J.D., Introductionto Flight	3	110-125
		Laws ofgravitation, kepler's law, micro-gravity,rockets,spacecrafts and planetory environment		8	679
		Basic forces on an aircraft, aerofoil nomenclature and types and airflow distribution, types of air-breathing engines-rocket engines-missiles,loadsonaircraft, Structural components and membersofanaircraft-schematics and purpose	Duchene, FlightWithout Formulae	4&5	53-70
II	**Aerodynamics**	Aerodynamicsanditsimportance, FlowregimesbasedonMach number,forcesandMoments, DerivationofLift,Dragand momentCoefficientswithpressure distribution,	Anderson, J.D., Introductionto Flight	4&5	134,290,294

		Variation of pressure distribution with respect to angle of attack Airfoil-nomenclature and types.Control surfaces, High Lift devices, Spoilers, Propeller, Rotary wing aircraft concepts,Compressible flow aerodynamics, shock and expansion waves.	Anderson, J.D., Introduction to Flight	4	290

III	**Propulsion**	Basic forces on an aircraft,need for thrust, working of reciprocating engines(2/4 stroke variants)		1&7	214
		Types and working of air-breathing engines, rocket engines-types and principles	V. Ganesan, Gas Turbines, Tata McGraw-Hill	7	220
		missiles and their types, Introduction to ramjet and scramjet engines		17	216,581
IV	Aircraft Performance	The role and design mission of an aircraft,Specification of the performance requirements and mission profile .Off-standard and design atmosphere. Measurement of air data.Air data computers	Eshelby, M.E.,Aircraft Performance;	I&2	1-9 10-37
		Equations of motion for performance-the aircraft force system.The propulsive forces– the thrust production engines	Aircraft Performance& Design J.D.Anderson	4	191-201
			Eshelby, M.E.,Aircraft Performance;	3	53-60
		power producing engines, variation of thrust,propulsive power and specific fuel consumption with altitude and flight speed	Aircraft Performance& Design J.D.Anderson	3	170-174
	Aircraft Measurement Instrument	Sensors and Instrumentation-pitot static tube, primary flight instruments, principles of gyro and accelerometer	Aircraft Instruments by EHJ Pallet	4,5,12&14	50,116,298,338

V	**ation**				
		Hydraulics and pneumatic systems, high lift devices, engine and navigation instruments.	AircraftInstrumentsby EHJ Pallet	5,12 &14	358,373

COURSECOVERAGESUMMARY

FOR

ENGINEERINGTHERMODYNAMICS

IIBTECH–ISEMESTER
(2024-2025)

ENGINEERINGTHERMODYNAMICS(R20A2103)
COURSE COVERAGE SUMMARY

Unit No.	Titleofthe Unit	TopicsoftheUnit	Name of the References/Text books	Chapter No.	Page No.
UNIT-1	Introduction: BasicConcepts	System, Control Volume, Surrounding, Boundaries, Universe, Types of Systems, Macroscopic and Microscopic view points,Thermodynamic Equilibrium, State, Property, Process, Cycle - Quasi - static Process, Work, Displacement & Other forms of Work, Heat, Point and Path functions, Zeroth Law of Thermodynamics - Concept of Temperature-Firstlaw of Thermodynamics – applied to a process and system, Energy, specific heats, Enthalpy,SteadyFlow Energy Equation.	Engineering Thermodynamics By: P. K. Nag	1 2 3 4 5	12-20 31-35 44-59 69-77 87-97
UNIT-2	Second Law of Thermodynamics andEntropy	Second Law of Thermodynamics, Kelvin-Planck and Clausius Statements andtheirEquivalence/ Corollaries, PMM of Second kind, Reversible and Irreversible processes, Carnot's principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of EntropyIncrease-	Engineering Thermodynamics By: P. K. Nag	6 7	117-127 158-175

		EnergyEquation, Availability and Irreversibility		8	220-225
UNIT-3	Gas Laws	Perfect Gas Laws – Equation of State, specific and Universal Gas constants -various Non-flow processes, properties, end states, Heat and Work Transfer, changes in Internal Energy - Throttling and Free Expansion Processes - Flowprocesses.Perfect Gas Model,derivations - Vander Waals Equation of State - Compressibilitycharts- variable specific Heats - GasTables-Dryness Fraction - Clausius - ClapeyronEquation Property tables.	Engineering Thermodynamics By: P. K. Nag	10	334-350
UNIT-4	Thermodynamic Relations	Mixtures of perfect Gases-MoleFraction, Mass fraction, Gravimetric and volumetric Analysis - Dalton'slawofpartial pressure, Avogadro's Laws of additive volumes - Mole fraction, Volume fraction and partial pressure, Equivalent Gas const. and Molecular Internal Energy. Enthalpy, specific heats and Entropy ofMixture of perfectGases.	Engineering Thermodynamics By: P. K. Nag	11	402-411
UNIT-5	Thermodynamic Cycles	Powercycles:Otto, Diesel, Dual Combustioncycles, LenoirCycle-	Engineering Thermodynamics By: P. K. Nag	13	523-540

		Description and representationonP-V and T-S diagram, Thermal Efficiency, Mean Effective Pressures on Air standard basis - comparison of Cycles. ApplicationofBrayton cycles in aviation.			

COURSECOVERAGESUMMARY

FOR

FLUIDMECHANICS

IIBTECH–ISEMESTER
(2024-2025)

FLUID MECHANICS   (R20A2101)
COURSE COVERAGE SUMMARY

Unit No	Title of the Unit	Topics of the Unit	Name of The Text Book	Chapter No	Page No
UNIT-I	**Fluid Properties**	Density,specificweight,specific gravity,	**FLUID MECHANICS &HYDRAULICMACHINES By** **Dr.R.K.BANSAL**	I	**1-2**
		surfacetension&capillarity		I	**23**
		Newton'slawofviscosity, incompressible &compressiblefluid		I	**5**
		Hydrostatic forceson submerged bodies: Pressure at a point,		II	**35**
		Pascal'slaw,		II	**35**
		Pressurevariationwith temperature and height, Center of pressure on vertical surfaces.		II	**37**
		Manometers- simple and differentialmanometers		II	**43-53**
		Inverted manometers,micro manometers, Pressure gauges.			**53**
UNIT-II	**Fluid Kinematics**	Streamline,pathline,streakline, stream tube,	**FLUID MECHANICS &HYDRAULICMACHINES By** **Dr.R.K.BANSAL**	V	**163**
		Classificationofflows:steady, unsteady, uniform, non uniform, laminar, turbulent flows. One dimensional &twodimensionalapproximation, 2-Dflowinwindtunnel		V	**163**
		Continuityequationsfor1-Dand 2-Dflowsbothcompressibleand incompressible,		V	**165**
		Velocitypotentialfunctionand stream function		V	**181**
UNIT-III	**Fluid Dynamics**	Surface & body forces,momentum equation, Euler equation, Bernoulli'sequation for flow along a	**FLUID MECHANICS &HYDRAULICMACHINES By** **Dr.R.K.BANSAL**	VI	**259** **260** **261**

		streamline.			
		Flowmeasurements:pressure, velocity and mass flow rate, viscosity,		VII	317-354
		venturimeterandorificemeter		VII	317-354
		Flowofthroughpipes: Darcy's WeisbachEquation,majorand minor losses.		XI	465-483
UNIT–IV	**Boundary Layerflows**	Introductoryconceptsofboundary layer, Prandtl'sboundarylayerhypothesis, Boundary layer growth along a flat plate. Boundarylayerthickness	**FLUID MECHANICS &HYDRAULICMACHINES By Dr.R.K.BANSAL**	XIII	611-656
		thickness(Displacement,Energyand Momentum), VonKarman'sMomentumIntegral Equation,		XIII	613
		Drag forces due to laminarandturbulent boundary layer on flatplate.		XIII	619
		Separation of boundary layer: Adverse pressure gradient and Sharp bending/turning of surface.Methodsof preventing separation of boundary layer.		XIII	648
UNIT-V	**Dimensional and Model Analysis**	Dimensional homogeneity, MethodsofDimensionalAnalysis,	**FLUID MECHANICS &HYDRAULICMACHINES By Dr.R.K.BANSAL**	XII	561
		Buckingham'sπ-theorem, ModelAnalysis		XII	565
		Similitude:Typesof similarities, Dimensionless numbers,Similarity laws.		XII	579

COURSECOVERAGESUMMARY
FOR
CAD/CAM

IIBTECH–ISEMESTER
(2024-2025)

DEPARTMENTOFAERONAUTICALENGINEERING

CAD/CAM (R20A2106) COURSE COVERAGE

TITLEOFTHE UNIT	TOPICSOF THEUNIT	NAMEOFTHETEXT BOOK	CHAPTER No.	PAGENo.
UNIT-I Introduction **Computer Graphics**	Computers in Industrial Manufacturing,Productcycle, CAD / CAM Hardware,Basic structure. Rasterscangraphicscoordinate system, Databasestructureforgraphics modelling, Transformationofgeometry, 3D transformations,Clipping.	CAD/CAM: PRINCIPLES AND APPLICATIONSBYPN Rao	I II III	1TO15 21TO45 53TO60 61TO70 70TO77 77TO80 80TO86
UNIT–II Geometric modelling	Requirements, geometric models, geometric Construction models, Curve representation methods, Surface representation methods, Modelling facilities desired.	CAD/CAM: PRINCIPLESAND APPLICATIONSBYPN Rao	IV	97TO122 123TO139 139TO151 164TO168
UNIT-III Numerical control	NC,NCmodes,NCelements,NC machinetools StructureofCNCmachinetools Features of Machining center turning center CNCPartProgramming fundamentals, Manualpart programming methods ComputerAidedPartProgramming.	CAD/CAM: PRINCIPLESAND APPLICATIONSBYPN Rao	IX X XII XIII	260TO272 274TO 290 316TO331 350TO 356 356TO360 361TO398
UNIT-IV Group Technology	Part family, coding and classification,Productionf lowanalysis, Advantagesandlimitations, ComputerAidedProcesses Planning,Retrievaltypeand Generativetype	CAD/CAM: PRINCIPLESAND APPLICATIONSBYPN Rao	XVIII	525TO532 536TO543 549TO554
UNIT-V Computer AidedQuality Control **Computer integrated manufacturing systems:**	Terminologyinqualitycontrol,the computerinQC,contactinspection methods, Noncontact inspection methods-optical, noncontact inspectionmethodsnon-optical, Computer aided testing, IntegrationofCAQCwithCAD/CAM. TypesofManufacturingsystems, Machine tools and related equipment, Materialhandlingsystems,	CAD/CAM: PRINCIPLESAND APPLICATIONSBYPN Rao	XXIII XXIV	694TO712 715TO729

	Computercontrol systems, Humanlaborinthemanufacturing systems, CIMSbenefits.			