PLANNED SYLLABUS COVERAGE(Theory)

GP Kangra	Department: Mechanical Engg. Subject Basic Mechanical Engineering
	Course Program Core Duration 14 weeks.
SYLLABUS COVERAGE	Total Periods 54 Theory TH.

Sr. No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1	1-14	Introduction to thermodynamics	Role of Thermodynamics in Engineering & science, Types of system, Thermodynamic Equilibrium, properties, State, process & cycle, Elementary introduction to Zeroth, First & Second law of thermodynamics Heat & work, interactions for various processes, Concept of Heat Engine, Heat pump & refrigerator, efficiency / COP Kelvin plank & clausius statement Carnot cycle, Carnot efficiency, T-S & P-V Diagrams, Concept of Entropy.	Basic Mechanical Engineering - M.P. Poonia & S.C. Sharma Elements of Mechanical Engineering - M. L. Mathur		
2.	15-25	Heat Transfer & Thermal Power plant	Heat transfer, Modes of Heat transfer, conduction fourier equation, conduction Heat transfer through Composite walls, simple Numerical problems, convection Heat transfer, Natural & Forced convection, Radiation & Absorption Reflection & transmission of radiation concept of black body, Stefan-Boltzmann Law, Thermal Powerplant Layout, Rankine cycle, Fire tube & water tube boiler, Babcock & Wilcox, Cochran Boiler.			
3.	26-34	Steam turbine & Internal combustion Engines	Impulse & Reaction turbines, condensers Jet & surface condensers, cooling towers, otto cycle, Diesel cycle. dual cycles, P-V & T-S Diagrams IC Engines, 2 stroke & 4-stroke. I.C Engines, SI & CI engines			

To be approved from concerned HOD within seven days from beginning of semester & will be kept with the concerned t
in his file.

Sr. No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Rema
4	35-45	Engineering Materials & manufacturing processes.	Engineering Materials, classification & their properties, Metal casting Moulding, Patterns, Metal working Hot working & Cold working, Metal forming, Extrusion, Forging, Rolling, drawing, Gas welding, Arc welding, soldering & brazing.			
5.	46-56	Machine tools & Machining Processes	Machine tools: lathe Machine & types, Lathe operations, Milling Machine & types, Milling operations, Shaper & planer Machines Difference b/w shaper & planer Machine Quick return Mechanisms, Drilling Machine, operations, Grinding Machine & operations.			

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Sr. No.	Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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Date 01/08/2025	HOD Sign
Date 01/08/2025	Principal Sign

Use additional sheets (if required).

GPK-F-17

PLANNED SYLLABUS COVERAGE(Theory)

G. P Kangra

Department: Mechanical Engg Subject Material Science + Engg.

Course Diploma Duration 14 weeks

SYLLABUS COVERAGE

Total Periods 56 Theory 56

Sr. NO.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
01.	1-14	Crystal structure and bonds.	1.1 Crystal system:- The seven basic crystal systems. 1.2 Crystal structure for metallic elements; BCC, FCC + HCP. 1.3 Co-ordination number for SCC, BCC + FCC. 1.4 Atomic radius for SCC, BCC FCC (only formula). 1.5 Atomic packing factor for SCC, BCC, FCC + HCP. Bonds in solids:- 1.6 Classification of primary and secondary bonds or molecular bonds 1.7 Concept of types of primary bonds; Ionic, covalent + metallic bonds.	Material Science + Engg by. R.K. Rajput		
02.		Phase diagram, diagram. Ferrous metals + its alloys.	2.1 Introduction to isomorphous, eutectic and eutectoid systems. 2.2. Iron-carbon binary Iron-carbon steels, Iron ores. Pig iron:- classification, composition + effects of impurities in iron.	Material Science by O.P. Khanna		

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...iod Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
15-27		Cast Iron:- composition, properties + uses. Wrought Iron:- properties, uses and applications. Standard & commercial grades of Steel as per BIS + AISI. Alloy steel:- purpose of alloying, effect of alloying elements. Important alloy steels; Silicon, High speed, Heat resisting, Spring and Stainless Steel.			
03. 28-37.		Non Ferrous Metals + its alloys.	3.1. Properties and uses of Aluminium, copper, tin, Lead, zinc, manganese and		

GPK-F-17

PLANNED SYLLABUS COVERAGE(Theory)

G. P Kangra

Department: Mechanical Engg. Subject Material Science & Engg.

Course Diploma Duration 14 weeks

SYLLABUS COVERAGE

Total Periods 56 Theory 56

Sr.No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
			Copper alloys:- Brasses, bronzes- composition, properties and uses. Aluminium alloys: Duralumin, Hindalium, magnelium- composition, properties and uses. Nickel alloys:- Inconel, Monel, Nicrome- composition, properties & uses. Anti-friction/Brearg alloys, various types of bearing, bronzes- Standards commercial grades as per BIS/ASME.			
04	38-46	Failure analysis & testing of Materials.	Introduction to failure analysis; fracture, ductile fracture, brittle fracture cleavage, Notch sensitivity fatigue; concept of endurance limit, concept of creep, creep curve, creep fracture; Destructive testing, Tensile testing, compression testing, Hardness testing; Brinell Rockwell; bend test; torsion test, fatigue test, creep test			

pproved from concerned HOD within seven days from beginning of semester & will be kept with the concerned teacher

od Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
47-56	~~47-56~~ corrosion and surface Engineering.	Non destructive testing visual inspection, magnetic particle inspection, liquid penetration test, radiography, ultrasonic inspection. Nature of corrosion and its causes: Electrolytes. Factors affecting corrosion Environment, material properties and physical conditions. Types of corrosion. corrosion control			

xtra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

eriod No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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PLANNED SYLLABUS COVERAGE(Theory)

GPK-F-17

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Department: Mechanical Engg. Subject Metrology & Measurements

Course Diploma (Mechanical) Duration 14 weeks

Total Periods 56 Hours Theory 56 Hours

Sr.No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1.	1-7	Introduction to Measurements	Defination of measurements, Significance of Measurements, Methods of Measurements: Direct & Indirect, Generalized Measuring System: Standards of Measurement Primary & Secondary, Factors influencing selection of measuring instruments, Terms applicable to measuring instruments, Precision & accuracy, sensitivity & repeatibility, range, Threshold, Hysteresis, Calibration, Error in Measurement Classification of errors, Systematic and Random errors.	Engineering Metrology by R.K. Jain		
2.	8-16	Measuring Instruments	Introduction, Thread measurement Thread gauge micrometer, Angle Measurements: Bevel Protractor, Sine bar, Gauges: Plain plug gauge, ring gauge, Snap gauge limit gauge, Comparators: Characteristics of comparators Types of comparators. Surface finish, Defination, Terminology of Surface finish, Taly surf Surface Roughness Tester, Co-ordinating Measuring machine	Mechanical Measurements & Instrumentation control by A.K. Sahoo		
3.	17-25	Transducers and Strain gauges	Introduction, Transducers Characteristics, Classification of transducers, Strain Measurement Strain gauge, Classification			

pproved from concerned HOD within seven days from beginning of semester & will be kept with the concerned teacher
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riod Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
		mounting of strain gauges.			
4 26-29	measurement of force, torque and pressure	Introduction: Force measurement Spring Balance, load cell; Torque Measurement: Prony brake, Eddy current, Hydraulic dynamometer Pressure Measurement, Mcleod gauge.			
5 30-34	Applied Mechanical Measurements	Speed measurement: classification of tachometers, Revolution counter Eddy current tachometer; Displacement measurement: Linear variable Differential transformers, Flow measurements, Rotometers, Turbine meter, Temperature measurement. Resistance thermometer optical pyrometer			

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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additional sheets (if required).

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PLANNED SYLLABUS COVERAGE(Theory)

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Department: Mechanical Engg. Subject Metrology & Measurements

Course Diploma (Mechanical) Duration 14 weeks

Total Periods 56 Hours Theory 56 Hours

Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
34-35	Miscellenous Measurements	Humidity measurements: Hair Hygrometer: Density Measurement Hydrometer: Liquid level Measurement, Sight glass, Floatgauge.			
36-43	Limit, fits & Tolerances	Concept of limits, fits & Tolerances, Selective Assembly, Interchangeability Hole and Shaft Basic Systems Taylor's Principale. Angular Measurements: concept instruments for Angular Measurement: Sine bar and use of Universal Bevel Protractor, Sine bar, Spirit level: Principle of working of clinometers: Angle Gauges	Engineering metrology By R.K. Jain Mechanical measurement & Instrumentation control by A.K. Sawhney		
44-51	Screw Thread Measurements	ISO grade and Fit of thread Error in threads, Measurement of different elements such as Major diameter, Minor diameter effective diameter, Pitch, Two wire method; Thread gauge micrometer, working principle of floating Carriage Dial micrometer.			

pproved from concerned HOD within seven days from beginning of semester & will be kept with the concerned teacher
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Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
49-56	(52-56) Gear measurement and Testing	(Gear) Analytical and Functional inspection, Rolling Test; measurement of tooth thickness Gear tooth Vernier. Errors in gear such as backlash, run out, composite Machine tool Testing:- Parallelism Straightness, Co-axially, roundness, runout alignment testing of machine tools as per IS standard procedure.			

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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Date	Principal Sign

additional sheets (if required).

PLANNED SYLLABUS COVERAGE(Theory)

GPK-F-17

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Department: Mechanical Engg. Subject Manufacturing Engineering
Course Diploma in Mechanical Engg. Duration 14 Weeks.
Total Periods _____ Theory _____

Sr.No	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1. Unit-1	1-5	Cutting fluids & Lubricants	Introduction: Types of cutting fluids, Fluids and coolants required in turning, drilling shaping, sawing & broaching Selection of cutting fluids methods of applications of cutting fluids, classification of lubricants (Solid, liquid gaseous), Properties and applications of lubricants.	Elements of workshop Technology (Volume I & II) SK Hajra Chaudhary Media Promoters and Publishers Limited	Manufacturing Technology - PN Rao, Tata Mc Graw-Hill Publications	
2.	6-10	Lathe operations	Types of lathes, light duty medium duty & heavy duty geared lathe, CNC lathe (Concept only), Specifications Basic parts and their functions, operations and tools - Turning, parting off, knurling, Facing Boring, drilling, threading Step turning, taper turning.			

pproved from concerned HOD within seven days from beginning of semester & will be kept with the concerned teacher
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iod Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
No W1 11-15 11-3	Broaching Machine	Introduction to broaching Types of broaching machine Horizontal type (Single Ram & duplex ram), Vertical type, Pull up, pull down and push down, elements of broach tool, Nomenclature tool, material for broaching	-do-	-do-	
4. 16-20	Drilling	Classification, Basic Parts and their functions Radial drilling machine Types of operations, specifications of drilling machine, Types of drills and reamers.	-do-	-do-	

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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Additional sheets (if required).

PLANNED SYLLABUS COVERAGE(Theory)

GPK-F-17

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Department: Mechanical Engg Subject Manufacturing Engg.
Course Diploma in Mechanical Eng Duration 14 weeks
Total Periods _____ Theory 56 days.

Sr. No	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
Unit-III 5.	21-26	Welding	Classification of welding techniques, Types of welding flames, Arc welding Principle equipment, applications, Shielded Metal arc welding, Submerged arc welding TIG M/G welding, Resistance welding, Spot welding Seam welding, Projection welding, Welding defects Brazing & Soldering	— do —	— do —	
6.	27-32	Milling	Introduction, Types of milling machine, Plain Universal, vertical Constructional details Specifications, milling operations, Simple Compound, Differential indexing (No numericals) Milling Cutters, Teeth materials Tool	— do —	— do —	

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Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
Unit IV 7.	31-38 Gear Making	Manufacture of gear by Casting, Moulding, Stamping Coining, Extruding, Rolling Machining Gear generating methods Gear shaping with pinion cutter & rack cutter, Gear hobbing, Description of gear hob operation of gear hobbing machine, Gear finishing process	-do-	-do-	

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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Date	HOD Sign
Date	Principal Sign

Additional sheets (if required).

PLANNED SYLLABUS COVERAGE(Theory)

GPK-F-17

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Department: Mechanical Engg. Subject Manufacturing Engg.

Course Diploma in Mech. Engg. Duration 14 weeks.

Total Periods _____ Theory 56 days.

S.No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
8.	39-44	Press Working (derivations & problems	Types of presses and specifications, Press working, operations - Cutting, bending, drawing, punching blanking, notching, lancing Die set components - punch and die shoe guide pin, bolster plate stripper, stock guide, feed stock, pilot, Punch & die clearance for blanking and piercing effect of clearance.	— do —	— do —	
Unit V 9.	45-56	Grinding & finishing processes.	Principles of metal removal by Grinding, abrasive - Natural & artificial Bond & binding processes, vitrified silicate, shellac rubber bakelite, factors affecting selection of grind wheels Size and shape of wheel Kind of abrasive, grain	— do —	— do —	

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Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
		Size, grade and strength of bond structure of grain, spacing, Kind of bind material, bonding machine classification cylindrical surface tool & cutter, grinding machine, Constructional details principle of Centreless Grinding, Advantages & limitations of Centreless grinding, Finishing by Grinding, Honing, Lapping Surface finishing Electroplating, Basic Principles	— do —	— do —	

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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Date	HOD Sign
Date	Principal Sign

Additional sheets (if required).

GPK-F-17

PLANNED SYLLABUS COVERAGE(Theory)

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Department: Mechanical Engg. Subject: Manufacturing Engineering

Course: Diploma in Mech. Engg. Duration: 14 weeks.

Total Periods _____ Theory: 56 days.

No	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
			Plating metal applications Hot dipping, Galvanizing Tin Coating, Parkerising Anodizing, metal spraying, Wire process powder Process and applications, Organic Coating, Finishing specifications	-do-	-do-	

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PLANNED SYLLABUS COVERAGE(Theory)

G P Kangra

Department: Mechanical Engg. Subject: Thermal Engg.-I

Course: Diploma Duration: 3 Years

SYLLABUS COVERAGE

Total Periods: 56 Theory: 56

Sr. No	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
1	1-8	Sources of Energy	Brief description of Energy sources; classification of energy sources: Renewable, Non renewable; Solar energy; Flat Plate and Concentrating Collectors & its applications (Solar water heater, Photovoltaic cells); Wind energy Tidal energy, ocean thermal energy, Geo-thermal energy, Biogas, Biomass, Biodiesel; Hydraulic Energy.	Thermal Engg. By R.S. Khurmi & J.K. Gupta S. Chand Publication		
2.	9-18	Internal Combustion Engines	Assumptions made in Air standard cycle analysis, Brief description with derivation of efficiency of Carnot, otto & Diesel cycles with PV and TS diagrams, Internal and External Combustion engines, function of each part and material used for component parts,	-do-		

To be approved from concerned HOD within seven days from beginning of semester & will be kept with the concerned teacher in his file

Sr. No	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
			Cylinder, Crank Case, Crankpin, Crank, Crank Shaft, Connecting rod, Wrist pin, Piston cylinder heads, Exhaust valve; Inlet valve; Working of 4-Stroke and two stroke Petrol and diesel engines, Comparison of four stroke and two stroke engines, Comparison of CI and SI engines, Valve timing and Port timing diagrams of 4-Stroke and 2-Stroke Engines.	-do-		

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Sr. No.	Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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Date 01/08/2025	HOD Sign
Date	Principal Sign

* Use additional sheets if required.

GPK-F-17

PLANNED SYLLABUS COVERAGE(Theory)

G P Kangra | Department: Mech. Engg. | Subject: Thermal Engg.-I | Course: Diploma | Duration: 3 years

SYLLABUS COVERAGE | Total Periods: 56 | Theory: 56

Sr. No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
3.	19-30	IC Engine Systems	IC Engine Systems:- Fuel system of petrol engines; Principle of operation of simple carburettor; fuel systems of diesel engines; Plunger type fuel injection pump, fuel feed pump and fuel injector (Description with line diagram); Cooling system; Air cooling, water cooling system with thermosyphon method of circulation and water cooling system with radiator and forced circulation (description with line diagram). Comparison of Air Cooling and water cooling system, Ignition Systems - Battery Coil ignition and Magneto ignition (Description & working). Comparison of two systems; Types of lubricating system used in IC engine with line diagram	-do- / -do-		

To be approved from concerned HOD within seven days from beginning of semester & will be kept with the concerned teacher in his file

Sr. No	Period Nos	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
			Objective of Turbocharging & supercharging.			
4.	31-40	Performance of IC Engines	Brake Power; Indicated Power; Frictional Power; Brake & mean effective Pressures; Brake and indicated thermal effecencies; Mechanical efficiency; Relative efficiency; Performance Test; Morse Test, Heat Balance sheet; Methods of determination of B.P, I.P and F.P; Simple Numerical Problems on Performance of I.C Engines.	— do —		

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Sr. No.	Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

Approved / Not approved

Date 01/08/2025	HOD Sign
Date	Principal Sign

Additional sheets if required

PLANNED SYLLABUS COVERAGE(Theory)

G P Kangra | Department: Mech Engg. | Subject: Thermal Engg.-I | Course: Diploma | Duration: 3 years | SYLLABUS COVERAGE | Total Periods: 56 | Theory: 56

Sr. No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
5.	41-56	Air Compressors	Function of Air Compressors, Uses of Compressed Air, Types of Air Compressors; Single stage reciprocating Air Compressors, its Construction & working (with line diagram), Multistage Compressors - Advantages over Single stage Compressors; Description of rotary Compressors, centrifugal Compressor, Axial flow Compressor and vane type Compressors.	-do-		
		Refrigeration & Air Conditioning (Problems Omitted)	Refrigeration; Refrigerant; COP; Air refrigeration system; Components, working & Applications; Air Conditioning, classification of Air Conditioning Systems; Window Air Conditioners; Summer Air Conditioning System;	-do-		

To be approved from concerned HOD within seven days from beginning of semester & will be kept with the concerned teacher in his file

Sr. No.	Period Nos.	Topic	Details	Instruction Reference	Additional Study Recommended	Remarks
			Winter Air Conditioning system, Year-Round Air Conditioning system, central Air Conditioning system.	-do-		

Extra Topics to be covered beyond the scope of the syllabus (as required by industry/ as recommended by Teacher which he/ she finds necessary)

Sr. No	Period No.	Topic Covered	Instruction Reference	Additional Study recommended	Remarks

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Date 01/08/2025	HOD Sign
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