



RSR RUNGTA COLLEGE OF ENGINEERING & TECHNOLOGY

Rungta Knowledge City

Kohka - Kurud Road, Bhilai (C.G.)-490024

Recognized by AICTE, New Delhi and Affiliated to CSVTU, Bhilai.

DEPARTMENT OF MECHANICAL ENGINEERING

COs:

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| Semester: | III |
| Course Name: | Mathematics -III |
| Course Code: | B000311(014) |
| CO1: | To define unit step, unit impulse, Laplace transform its properties |
| CO2: | To understand partial differential equation and its various engineering applications |
| CO3: | To understand the concept of rand variable and differential distribution function, its importance calculation of different experiment |
| CO4: | To provide a thorough understanding of interpolation and methods to solve ordinary differential equation |
| CO5: | To solve ordinary differential equations and find Numerical solution of differential equations, which may be arising due to mathematical modelling based on engineering problems. |

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| Semester: | III |
| Course Name: | Mechanical Measurement and Metrology |
| Course Code: | B037312(037) |
| CO1: | Describe the functional elements of measurement system and its performance characteristics. |
| CO2: | Describe measurement of pressure, strain and temperature. |
| CO3: | Describe flow measurement, vibration measurement and data acquisition system. |
| CO4: | Describe linear and angular measurement devices, measurement of geometrical forms, optical projectors, tool maker microscope and autocollimators. |
| CO5: | Describe interferometer, comparators, screw thread and gear measurement and coordinate measuring machine. |



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| Semester: | III |
| Course Name: | Engineering Mechanics |
| Course Code: | B037313(037) |
| CO1: | Apply basic concepts and laws of mechanics to determine resultant and analyze the systems of forces. |
| CO2: | Analyze static system by applying law of friction/ principle of virtual work. |
| CO3: | Determine the centroid, second moment of area and product of inertia of simple and composite plane figures and centre of gravity and mass moment of inertia of simple and composite bodies. |
| CO4: | Analyze problem related to kinematics of a particle and rigid bodies. |
| CO5: | Analyze problem related to kinetics of rigid bodies. |

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| Semester: | III |
| Course Name: | Engineering Thermodynamics |
| Course Code: | B037314(037) |
| CO1: | Apply basic concepts and first laws of thermodynamics to analyze thermodynamics system. |
| CO2: | Apply the concepts of second law of thermodynamics and entropy to analyze thermodynamics system. |
| CO3: | Apply the concepts of exergy to solve related problems. |
| CO4: | Explain the equations of state and thermodynamic properties of real gases and calculate properties of mixture of ideal non- reactive gases. |
| CO5: | Analyze processes involving pure substances. |



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| Semester: | III |
| Course Name: | Material Science |
| Course Code: | B037315(037) |
| CO1: | Explain crystal structure and Imperfection in crystal structure. |
| CO2: | Define basic mechanical properties of materials & explain the theories of deformation. |
| CO3: | Explain solidification phenomenon of pure metal, alloys and interpret phase diagrams. |
| CO4: | Explain how microstructure and mechanical properties of carbon and alloy steels are controlled by various heat treatment/surface treatment processes. |
| CO5: | Compare characteristics of various ferrous, nonferrous and composite materials |

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| Semester: | IV |
| Course Name: | Applied Thermodynamics |
| Course Code: | B037411(037) |
| CO1: | Analyze and evaluate gas power cycles. |
| CO2: | Analyze reciprocating air compressors. |
| CO3: | Analyze vapour power cycle. |
| CO4: | Analyze steam condenser and discuss working principle of cooling pond and cooling towers. |
| CO5: | Analyze thermodynamic system with compressible fluid. |



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| Semester: | IV |
| Course Name: | Fluid Mechanics |
| Course Code: | B037412(037) |
| CO1: | Explain fluid properties and basic principles of fluid statics and analyze the problem related to manometry, forces on submerge plane, buoyancy and flotation. |
| CO2: | Explain basic principles of fluid kinematics and analyze related practical problem. |
| CO3: | Explain basic principles of fluid dynamics and analyze related practical problem. |
| CO4: | Derive relationships for various flow characteristics of laminar flow, turbulent flow and energy losses in pipe flow and apply to analyze related practical problems. |
| CO5: | Apply dimensional analysis to derive a relationship among connected variables and apply model laws to predict the behaviour of the prototype in given circumstances. |

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| Semester: | IV |
| Course Name: | Strength of Materials |
| Course Code: | B037413(037) |
| CO1: | Apply the concept of stress and strain to analyze various types of structures. |
| CO2: | Determine the distribution of shear force, bending moment and transverse shear stress along the loaded beam. |
| CO3: | Determine the deflections and slope of loaded flexural members. |
| CO4: | Analyze shaft and springs under torsional load. |
| CO5: | Analyze various structural elements subjected to combined stresses/combined loads. |



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| Semester: | IV |
| Course Name: | Manufacturing Process |
| Course Code: | B037414(037) |
| CO1: | Describe various metal casting and allied processes. |
| CO2: | Describe various arc and gas welding processes. |
| CO3: | Describe resistance welding, other special type of welding, soldering, brazing and braze welding |
| CO4: | Describe construction, working and various machining operations of lathe, shaper and planer |
| CO5: | Describe construction, working and various machining operations of milling, broaching, drilling rimming and boring machine |

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| Semester: | IV |
| Course Name: | Kinematics of Machine |
| Course Code: | B037415(037) |
| CO1: | Describe the concepts of machines, mechanisms and related terminologies and analyze planar mechanism for displacement and velocity. |
| CO2: | Analyze planar mechanism for acceleration. |
| CO3: | Analyze cam-follower mechanism. |
| CO4: | Analyze gears and gear train. |
| CO5: | Analyze bearings, belt-drive, brakes and dynamometer |



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| Semester: | V |
| Course Name: | Internal Combustion Engine |
| Course Code: | C037511(037) |
| CO1: | Describe the construction and working principle of various internal combustion engines. Explain the concepts of fuel air cycle and actual cycle and apply it to analyze related practical problems. |
| CO2: | Explain the theory of combustion of S.I. engine and C.I. engine, describe I.C.Engine fuels and solve problem related to flue gas analysis. |
| CO3: | Discuss properties of air-petrol mixtures and describe fuel supply system of S.I. and C.I. Engine. |
| CO4: | Describe ignition system, cooling system, lubrication system and Engine emissions and its control. |
| CO5: | Describe various performance parameter of I.C. Engine, its method of testing and analyze related practical problems. |

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| Semester: | V |
| Course Name: | Solid Mechanics |
| Course Code: | C037512(037) |
| CO1: | Analyze problems related to deformable body under load using energy methods. |
| CO2: | Analyze fixed beams and continuous beams under load. |
| CO3: | Analyze thin and thick pressure vessels. |
| CO4: | Analyze column and find shear center. |
| CO5: | Solve plane stress and plain strain problems |



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| Semester: | V |
| Course Name: | Fluid Machines |
| Course Code: | C037513(037) |
| CO1: | Explain the concepts of 'boundary layer theory' and lift and drag theory and apply to solve related practical problems |
| CO2: | Explain the principle of impulse-momentum and impulse turbines and apply it to analyze related problems. |
| CO3: | Explain the construction and principle of operation of reaction turbine and apply it to analyze related problems. |
| CO4: | Explain the construction and principle of operation of centrifugal pump and apply it to analyze related problems. |
| CO5: | Explain the construction and principles of operation of reciprocating pump and apply it to analyze related problems. |

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| Semester: | V |
| Course Name: | Dynamics of Machines |
| Course Code: | C037514(037) |
| CO1: | Formulate and solve real-world problems as linear programs for better decision-making. |
| CO2: | Solve specialized linear programming models like the transportation and assignment Models. |
| CO3: | Model a dynamic system as a queuing model and compute important performance measures. |
| CO4: | Use CPM and PERT techniques, to plan, schedule and control project activities. |
| CO5: | Propose the best strategy using decision making methods under game theory & apply concepts of Simulation to optimize practical problems. |



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| Semester: | V |
| Course Name: | Operation Research |
| Course Code: | C037531(037) |
| CO1: | Formulate and solve real-world problems as linear programs for better decision-making. |
| CO2: | Solve specialized linear programming models like the transportation and assignment Models. |
| CO3: | Model a dynamic system as a queuing model and compute important performance measures. |
| CO4: | Use CPM and PERT techniques, to plan, schedule and control project activities. |
| CO5: | Propose the best strategy using decision making methods under game theory & apply concepts of Simulation to optimize practical problems. |

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| Semester: | VI |
| Course Name: | Design of Machine Elements |
| Course Code: | C037611(037) |
| CO1: | Select proper material for specific application with proper assumptions with respect to design stress, factor of Safety, stress concentration factor and theory of failure. |
| CO2: | Design and analyze Mechanical Joints, keys and couplings. |
| CO3: | Design and analyze shafts, axle and clutches. |
| CO4: | Design and analyze threaded fastener and power screws. |
| CO5: | Design and analyze riveted and welded joint. |



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| Semester: | VI |
| Course Name: | Manufacturing Technology |
| Course Code: | C037612(037) |
| CO1: | Explain the principles and techniques of grinding and other surface finishing operations. |
| CO2: | Explain the principles and appropriateness of unconventional machining processes and analyze related Process parameters. |
| CO3: | Describe the principles and techniques of forging and extrusion operations, determine their suitability and Analyze related process parameters. |
| CO4: | Describe the principles and techniques of rolling and drawing operations and be able to analyze related Process parameters. |
| CO5: | Describe the principles and techniques of sheet metal forming operation and be able to analyze related Process parameters. |

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| Semester: | VI |
| Course Name: | Heat & Mass Transfer |
| Course Code: | C037613(037) |
| CO1: | Explain the principles of heat transfer due to conduction, convection and radiation and analyze problems Related to conduction. |
| CO2: | Analyze problems related to heat transfer from extended surfaces and unsteady state heat conduction. |
| CO3: | Analyze problems related to forced convection and natural convection. |
| CO4: | Apply basic concepts of phase change processes and principles of mass transfer to solve related practical problems. |
| CO5: | Analyze heat exchangers and problems related to radiation. |



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| Semester: | VI |
| Course Name: | Power Plant Engineering |
| Course Code: | C037632(037) |
| CO1: | Describe the elements of power plant. |
| CO2: | Describe the working principle and basic components of steam power plants and analyze and its working. |
| CO3: | Describe the working principle and basic components of hydroelectric and diesel power station and analyze its working. |
| CO4: | Describe the working principle and basic components of nuclear power station and analyze and its working. |
| CO5: | Discuss variable load problems and power station economic |

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| Semester: | VI |
| Course Name: | Environmental Pollution & Control |
| Course Code: | C000610(037) |
| CO1: | Understand contemporary pollution issues. |
| CO2: | Have insight into specific examples of environmental pollution. |
| CO3: | Understand the causes and effects of key types of environmental pollution. |
| CO4: | Appreciate different pollution control strategies. |
| CO5: | Awareness of Environmental Laws & Acts |



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| Semester: | VII |
| Course Name: | Design of Transmission System |
| Course Code: | D037711(037) |
| CO1: | Model, analyze and design spur gears. |
| CO2: | Model, analyze and design helical and bevel gears. |
| CO3: | Model, analyze and design springs and brakes. |
| CO4: | Model, analyze and design bearings. |
| CO5: | Model, analyze and design chain and belt drives. |

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| Semester: | VII |
| Course Name: | Refrigeration and Air Conditioning |
| Course Code: | D037712(037) |
| CO1: | Analyze vapour compression refrigeration system. |
| CO2: | Analyze gas and air cycle refrigeration system. |
| CO3: | Analyze vapour absorption system, describe refrigerant and refrigeration equipment. |
| CO4: | Explain terminologies of psychrometry and human comfort and apply to analyze related problems. |
| CO5: | Carry out cooling load calculations and describe air-conditioning systems. |



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| Semester: | VII |
| Course Name: | Automation in Manufacturing |
| Course Code: | D037713(037) |
| CO1: | Illustrate the basic concepts of automation in machine. |
| CO2: | Explain the fundamentals of CAD. |
| CO3: | Explain the basics of computer aided manufacturing. |
| CO4: | Discuss the low-cost automation systems. |
| CO5: | Explain the basic concepts of modeling and simulation. |

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| Semester: | VII |
| Course Name: | Machine Tools Technology |
| Course Code: | D037731(037) |
| CO1: | Demonstrate an understanding of cutting tool materials and tool geometries and apply mechanics of metal cutting for analysis of related problems. |
| CO2: | Demonstrate an understanding of concepts of machinability, mechanism of tool failure, thermal aspects in machining and cutting fluid. |
| CO3: | Describe the construction features of machine tool elements and analyze the forces and torque acting on it. |
| CO4: | Design speed gear box. |
| CO5: | Design feed gear box and describe acceptance tests of machine tools. |



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| Semester: | VII |
| Course Name: | Non-Conventional Energy Sources |
| Course Code: | D000724(025) |
| CO1: | Demonstrate the generation of electricity from various non-conventional sources of energy, have a working knowledge on types of fuel cells. |
| CO2: | Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation. |
| CO3: | Explore the concepts involved in wind energy conversion system by studying its components, types and performance. |
| CO4: | Illustrate ocean energy and explain the operational methods of their utilization. |
| CO5: | Acquire the knowledge on geothermal energy. |

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| Semester: | VIII |
| Course Name: | Robotics |
| Course Code: | D037811(037) |
| CO1: | Demonstrate the basic knowledge of terminologies, characteristics, components and applications of robotics systems. |
| CO2: | Apply spatial transformation to obtain forward kinematics equation of robot manipulators. |
| CO3: | Perform position analysis and velocity analysis of direct and inverse kinematic models of robots. |
| CO4: | Describe sensing technologies and robotics vision system and choose the appropriate for a given application. |
| CO5: | Develop and analyze the mathematical model for motion planning and control of robot manipulators and describe robotics applications. |



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| Semester: | VIII |
| Course Name: | Automobile Engineering |
| Course Code: | D037831(037) |
| CO1: | Describe the basic structure of an automobile with applied engineering principle in its design. |
| CO2: | Describe clutches and fluid flywheel and solve related problems. |
| CO3: | Describe construction and working principle of gear box and torque converter and analyze problem related automobile performance. |
| CO4: | Describe construction and working of propeller shaft, differential, axle assembly, tyres and braking system of an automobile |
| CO5: | Describe construction and working of steering and electrical systems with applied engineering principle in its design. |

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| Semester: | VIII |
| Course Name: | Production and Product Management |
| Course Code: | D000806(037) |
| CO1: | The students will know about organization, production systems and cost analysis |
| CO2: | The students will know about the methods of making sales forecasting |
| CO3: | The students will know about Production planning and control in industrial context |
| CO4: | The students will understand the methods of material handling and materials management |
| CO5: | The students will able to appreciate the methods of quality control |