GEMS POLYTECHNIC COLLEGE

(Approved by AICTE, Govt. of India, F. No Northern/2015/1-2474317051)
NH-2, Jogiya more, Ratanpura, Aurangabad, Bihar– 824121

TABLE 3.1.1 Course Outcomes (CO)

The students will be able to

Course Name	Basic Engineering Mathematics	Course Year	2024 - 2025	Semester	1
C101.1	Solve the systems of equations of matrices & Vector algebra				
C101.2	Solve the simple problems on functions, limits, continuity function and derivatives.				
C101.3	Solve the problems & applications on differential calculus.				
C101.4	Use the concept of Coordinate geometry to solve the problems.				
C101.5	Use the concepts of probability and solve the problems.				

Course Name	Applied Chemistry -A	Course Year	2024 - 2025	Semester	1
C102.1	Solve various engineering problems applying the basic concepts of atomic structure, chemical bonding, and solutions.				
C102.2	Use relevant water treatment techniques to solve domestic and industrial problems.				
C102.3	Solve engineering problems using concepts of engineering materials and properties				
C102.4	Use relevant fuels and lubricants for domestic and industrial applications.				
C102.5	Solve engineering problems using the concepts of electrochemistry and corrosion.				

Course Name	Fundamentals of Mechanical Engg.	Course Year	2024 - 2025	Semester	1
C103.1	Interpret laws of thermodynamics				
C103.2	Calculate brake thermal efficiency for the given data of an IC engines.				
C103.3	Select relevant material and mechanical tools for a given job.				
C103.4	Use relevant manufacturing process for a given component.				
C103.5	Select relevant power transmission drives in real life application.				

Course Name	Communication Skills (English)	Course Year	2024 - 2025	Semester	1
C104.1	Communicate contextually in different situations.				
C104.2	Use Verbal Communication Effectively				
C104.3	Deploy Non-Verbal Communication Contextually.				
C104.4	Write various texts using vocabulary and correct grammar.				
C104.5	Draft effective business correspondence with brevity and clarity.				

Course Name	Engg. Drawing & Graphics	Course Year	2024 - 2025	Semester	1
C105.1	Use drawing instruments, drawing codes, dimensioning, conventions and symbols as per IS SP46(2003) in engineering drawing.				
C105.2	Draw geometrical figures, curves and engineering scales.				
C105.3	Draw the views of objects using principles of orthographic projection.				
C105.4	Draw isometric views of components directly or from orthographic projections.				
C105.5	Draw free hand sketches of engineering elements, their orthographic and isometric views.				
C105.6	Use computer aided drafting software to draw 2D and isometric geometric entities.				

Course Name	Mechanical Workshop	Course Year	2024 - 2025	Semester	1
C106.1	Undertake wood working operations economically and safely.				
C106.2	Carryout fitting and turning operations properly in a given situation.				
C106.3	Perform various joining operations using welding, brazing, and soldering methods.				
C106.4	Perform various sheet metal operations as per given sketch/ drawing.				
C106.5	Undertake black smithy operations safely.				

Course Name	Professional Ethics (Non-Exam)	Course Year	2024 - 2025	Semester	1
C107.1	Demonstrate good values and ethics in the day to day activities and at workplace.				
C107.2	Identify a set of values and ethics related to fair professional practice.				

Course Name	Sports, Yoga and Meditation	Course Year	2024 - 2025	Semester	1
C108.1	Select appropriate physical activities to maintain healthy lifestyle.				
C108.2	Apply basic principles and practices of Yoga and meditation for overall growth & development.				
C108.3	Use fitness and wellness techniques for optimal health and well being				
C108.4	Apply ancient Indian ayurvedic methods and techniques, exercises, yoga and meditation for fitness and wellness.				

Course Name	Applied Physics-A	Course Year	2024 - 2025	Semester	2
C109.1	Estimate the errors in measurements of physical quantity with precision.				
C109.2	Apply the concepts and principles of rotational motion in various civil and mechanical engineering problems.				
C109.3	elect relevant materials for industrial applications based on its physical and thermal properties.				
C109.4	Apply the concept of waves for various engineering applications involving wave dynamics				
C109.5	Apply the basic concepts of modern physics for solving engineering problems.				

Course Name	Python Programming	Course Year	2024 - 2025	Semester	2
C110.1	Use various data types and operators in formation of expressions.				
C110.2	Write and execute programs using control statements.				
C110.3	Perform relevant operations on Sequence data types				
C110.4	Create functions in modules				
C110.5	Use object-oriented approach and features in writing python programs				
C110.6	Handle data files and exceptions.				

Course Name	Engg. Mechanics	Course Year	2024 - 2025	Semester	2
C111.1	Compute the force to solve the problems				
C111.2	Analyse various analytical and graphical conditions required for equilibrium of engineering system				
C111.3	Apply the principles of friction in various conditions to solve problems.				
C111.4	Calculate centroid, center of gravity and moment of Inertia of different geometrical shapes.				
C111.5	Select the relevant lifting machine(s) for the given purposes.				

Course Name	Applied Mathematics -A	Course Year	2024 - 2025	Semester	2
C112.1	Demonstrate the ability to solve engineering-related problems based on applications of integration.				
C112.2	Develop the ability to use differential equations as a tool to solve problems related to engineering.				
C112.3	Select a suitable method to solve nonlinear equations based on engineering applications.				
C112.4	Measure the area and volume of engineering-related problems using the concept of numerical integration.				
C112.5	Develop the ability to use probability distribution to solve broad-based engineering-related problems.				

Course Name	Environmental Education and Sustainable Development (Non-Exam)	Course Year	2024 - 2025	Semester	2
C113.1	Explain the importance of ecosystem for the protection of environment				
C113.2	Use relevant air & water pollution control methods to solve pollution related issues				
C113.3	Recognize relevant energy sources required for domestic & industrial application				
C113.4	Analyze the issues of climate change and its impact on sustainability				
C113.5	Apply engineering solutions/methods/legislations to reduce the activities that are harming the environment.				

Course Name	Indian Constitution (Non-Exam)	Course Year	2024 - 2025	Semester	2
C114.1	Enumerate salient features and characteristics of the constitution of India.				
C114.2	Follow fundamental rights and duties as responsible citizen and engineer of the country.				
C114.3	Analyze major constitutional amendments in the constitution.				

Course Name	ICT Tools	Course Year	2024 - 2025	Semester	2
C115.1	Prepare business document using word processing tool.				
C115.2	Manipulate data and represent it graphically using spreadsheet.				
C115.3	Prepare professional slide-based presentations.				
C115.4	Work effectively with Internet and basic web services				

Course Name	Essence of Indian Knowledge System and Tradition (Non-Exam)	Course Year	2024 - 2025	Semester	2
C116.1	Identify the rich heritage and legacy residing in our Indian Knowledge systems.				
C116.2	Correlate the technological & philosophical concepts of IKS with engineering domain specific problems and local problems for finding out possible solutions.				

Course Name	Principles of Management (Non-Exam)	Course Year	2024 - 2025	Semester	2
C117.1	Design strategic plan for various types of organizations.				
C117.2	Take decisions to handle world of work situations.				
C117.3	Formulate organizational hierarchy for different situations.				
C117.4	Identify various leadership styles.				

Course Name	Basic Surveying	Course Year	2025 - 2026	Semester	3
C201.1	Undertake the relevant type of survey for the given purpose in the given situation.				
C201.2	Apply the necessary correction to the linear measurements recorded in the field book.				
C201.3	Conduct chain and compass traverse survey in the given field.				
C201.4	Draw the contour map of the given terrain using the relevant levelling instrument.				
C201.5	Use a digital planimeter to measure the area of the given figure or shape.				

Course Name	Concrete Technology	Course Year	2025 - 2026	Semester	3
C202.1	Select the relevant type of cement for different site conditions.				
C202.2	Use the relevant type aggregate for the given concrete works.				
C202.3	Conduct the relevant type of tests on the given sample of concrete mix.				
C202.4	Design the relevant concrete mix as per desired specification.				
C202.5	Suggest relevant admixture for the different concreting situations.				

Course Name	Strength of Material for Civil Engg.	Course Year	2025 - 2026	Semester	3
C203.1	Articulate practical applications of moment of inertia of symmetrical and unsymmetrical structural sections.				
C203.2	Analyze structural behavior of materials under various loading conditions.				
C203.3	Compute the principal stresses on an object at a given loading condition.				
C203.4	Interpret shear force and bending moment diagrams for various types of determinate beams and loading conditions.				
C203.5	Determine the bending and shear stresses in beams under different loading conditions.				
C203.6	Analyze the given truss using analytical methods.				

Course Name	Building Construction & Material	Course Year	2025 - 2026	Semester	3
C204.1	Select suitable materials for a given building construction project.				
C204.2	Use the modern construction materials for a given construction conditions.				
C204.3	Explain various components & their functions of a given building structure.				
C204.4	identify relevant type of foundation for a given building structure.				
C204.5	Supervise various activities of a given building construction project.				
C204.6	Select suitable horizontal & vertical components of a given building construction project.				

Course Name	Water Resource Engg.	Course Year	2025 - 2026	Semester	3
C205.1	Compute the hydrological parameters using relevant method in the given situation				
C205.2	Estimate the crop water requirement of the command area to determine the capacity of canal.				
C205.3	Suggest the relevant type of Dam for the given purpose in the given situation.				
C205.4	Select the relevant method of irrigation in a given situation.				

C205.5	Propose the relevant type of diversion headwork for the given site conditions.

Course Name	Summer Internship – I	Course Year	2025 - 2026	Semester	3
C206.1	Comprehend the practices of identified industry or world of work related to diploma engineering programme of study.				
C205.2	Map real equipment, processes, product, management, operations etc. to the course of study through various glimpses of input, process and output in different type of industries.				
C205.3	Identify the probable enterprises /startups for futuristic planning and self-growth.				
C205.4	Identify the probable job function and job position in their relevant programme of study.				

Course Name	Advance Surveying	Course Year	2025 - 2026	Semester	4
C207.1	Draw the plan of the given building using Plane table survey.				
C207.2	Measure the angle between two given stations using Theodolite.				
C207.3	Determine the reduced level of the given point using Tachometer.				
C207.4	Use Total Station instrument for the given purpose in the given situation.				
C207.5	Locate coordinates of stations on ground using GPS.				

Course Name	Theory of Structure	Course Year	2025 - 2026	Semester	4
C208.1	Analyze stresses induced in vertical member subjected to direct and bending loads.				
C208.2	Calculate slope and deflection at the given point of the beam subjected to given loading conditions.				
C208.3	Calculate end moments of fixed beam under given loading.				
C208.4	Analyze continuous beam under given loading conditions using Clapeyron's theorem of three moments.				
C208.5	Analyze continuous beam under given loading conditions using Moment Distribution method.				
C208.6	Check the safety of column for the given loading and end conditions.				

Course Name	Building Planning and Drawing with Auto CAD	Course Year	2025 - 2026	Semester	4
C209.1	Interpret the conventions, symbols, types of line and types of scale from the given drawings.				
C209.2	Prepare line plans of given buildings using the principals of building planning.				
C209.3	Prepare drawing of load bearing structures as per the given requirements.				
C209.4	Prepare drawing of framed structures as per the given requirements.				
C209.5	Prepare two-point perspective plan for given small objects such as steps, monuments, pedestals.				
C209.6	Prepare 2D and 3D drawings as per the given requirements using CAD software.				

Course Name	Soil Mechanics & Foundation	Course Year	2025 - 2026	Semester	4
C210.1	Classify different types of soil used in engineering applications.				
C210.2	Compute physical and index properties of given sample of soil for the given construction site.				
C210.3	Determine the permeability of the given sample of soil using relevant laboratory test method.				
C210.4	Calculate the shear strength parameters for field condition using relevant laboratory/ field test method.				
C210.5	Determine the bearing capacity of the given soil sample using the relevant laboratory/field test method as per the provision of IS Code.				

Course Name	Transportation Engg.	Course Year	2025 - 2026	Semester	4
C211.1	Classify the types of roads as per Indian Road Congress (IRC) recommendations.				
C211.2	Design the geometric characteristics of the given road.				
C211.3	Carry out the relevant test required for selection of the pavement material.				
C211.4	Justify the need of Permanent way in the Railway Engineering.				
C211.5	Rectify the defects normally observed in the given railway Track				

Course Name	Hydraulics	Course Year	2026 - 2027	Semester	5
C301.1	Measure the pressure acting on the given type of fluid in the given situation.				
C301.2	Apply the Bernoulli's equation along with continuity eqaition for the fluid flow through closed conduits.				
C301.3	Apply the Darcy Weisbach Equation to determine head loss of fluid flow through pipes.				

C301.4	Design the most economical section of the given type of channel using Chezy's and Manning's formulae for the given data.
C301.5	Calculate the discharge through notches and weirs.

Course Name	**RCC Structure**	**Course Year**	**2026 - 2027**	**Semester**	**5**
C302.1	Design singly reinforced rectangular beam sections using the relevant method of design under differer loading conditions.				
C302.2	Design doubly reinforced rectangular beam sections using Limit State Method subjected to different loading conditions.				
C302.3	Design shear reinforcement for a given beam section based on the provisions of IS 456-2000.				
C302.4	Design a given slab using IS code method & under given loading conditions.				
C302.5	Design axially loaded short column and isolated square footing as per IS code 456-2000 provisions.				

Course Name	**Estimating, Costing & Contracts**	**Course Year**	**2026 - 2027**	**Semester**	**5**
C303.1	Estimate the quantities of materials for the given civil work using relevant method of estimation.				
C303.2	Carry out rate analysis for the given item of work of a construction projects.				
C303.3	Prepare contract documents for the given civil construction work.				
C303.4	Carry out tendering process for the given civil construction work.				
C303.5	Apply the relevant method of valuation to decide the cost of the given project.				

Course Name	**Drone Technology (Basic)**	**Course Year**	**2026 - 2027**	**Semester**	**5**
C304.1	Operate a drone safely by applying appropriate drone rules and regulations.				
C304.2	Design the structure of drone with drone components and equipment.				
C304.3	Interface flight controller board with sensors, ESC and radio communication unit in drone technology.				
C304.4	Use drone simulator and identify different types of ports and connectors of drone.				
C304.5	Apply the relevant method of valuation to decide the cost of the given project.				

Course Name	**Entrepreneurship Development & Start-ups**	**Course Year**	**2026 - 2027**	**Semester**	**5**
C305.1	Demonstrate traits of a successful intrapreneur/ entrepreneur/ start-up co-founder.				
C305.2	Innovate products and services using creativity and innovation techniques.				
C305.3	Manage critical resources from support institutions.				
C305.4	Prepare sustainable small business plans.				

Course Name	**Summer Internship- II**	**Course Year**	**2026 - 2027**	**Semester**	**5**
C306.1	Develop the comprehensive view of industry 4.0 elements and 21st century skills requirements in the relevant diploma engineering programme through Summer Internship-II.				
C306.2	Outline the importance of industrial training and Internship for gaining direct practical skills on their relevant domain area of industrial equipment, automation, machinery, processes, product, management, operations, software development etc.				
C306.3	Use the knowledge and skills gained during industrial training or world of work.				

Course Name	**Minor Project**	**Course Year**	**2026 - 2027**	**Semester**	**5**
C307.1	Identify a real-world problem in the form of a project to be developed.				
C306.2	Perform literature survey related to the identified area/problem.				
C306.3	Identify preliminary resource requirements (Equipment, Tools, Software, Manpower, Services)				
C306.4	Prepare project synopsis for the identified problem/project title within stipulated time period.				

Course Name	**Environmental Engg.**	**Course Year**	**2026 - 2027**	**Semester**	**6**
C308.1	Determine the physical, chemical and biological properties of a given sample of water.				
C308.2	Undertake the purification of water using relevant method of water treatment processes.				
C308.3	Propose the relevant method of water distribution system for the given locality.				
C308.4	Describe the functional utility of the relevant components of drainage and sewerage system used in the given locality.				
C308.5	Undertake the treatment of given sample of sewage based on its characteristics.				

Course Name	Steel Structure	Course Year	2026 - 2027	Semester	6
C309.1	Select suitable type of steel section for a given steel structural member in accordance with IS 808:1989.				
C309.2	Design suitable joint for connecting various steel structural members using specified data.				
C309.3	Design suitable tension member for a given steel structure using specified data.				
C309.4	Design suitable compression member for a given steel structure using specified data.				
C309.5	Design suitable beam section for a given steel structure using specified data.				

Course Name	Pre-Stress and Precast Concrete	Course Year	2026 - 2027	Semester	6
C310.1	Explain the need of pre-stressed concrete in construction.				
C310.2	Select the relevant methods / systems of pre-stressing for the given structural element of the civil structure.				
C310.3	Design a pre-stressed concrete beam for the given condition of loading.				
C310.4	Select the relevant precast concrete element for the given type of construction.				
C310.5	Use the relevant components for the given prefabricated structure.				

Course Name	Drone Technology (Advanced)	Course Year	2026 - 2027	Semester	6
C311.1	Apply the concept of engineering mechanics for stability of drone.				
C311.2	Design the structure of drone using GPS module and thermal Image camera.				
C311.3	Operate drone using advance flight controller board.				
C311.4	Perform drone maintenance and assembly.				
C311.5	Use drone in advance applications like precision agriculture, security, IoT, etc.				

Course Name	Major Project	Course Year	2026 - 2027	Semester	6
C312.1	Integrate the knowledge (K), skills (S), attitudes (A)developed, in a new task or problem identified in the form of project work.				
C312.2	Develop higher level of cognitive, psychomotor and affective domain skills relevant to the course/programme.				
C312.3	Solve the industrial/real world problems/tasks by Integrating the generic skills/soft skills/employable skills with relevanttechnical skills.				
C312.4	Develop thecapabilities and skills of innovativeness, creativity, resourcefulness, time management, problem solving abilities, interpersonal skills, pro-activeness, cost effectiveness, environment consideration and sustainability.				
C312.5	Prepare the project report.				

Course Name	Employability Skills Development (Non-Exam)	Course Year	2026 - 2027	Semester	6
C313.1	Build resume and showcase portfolio for placement activity.				
C313.2	Face interviews and participate effectively in Group Discussions				
C313.3	Apply engineering tools in work situations and societal processes.				

Course Name	Open Educational Resources (Non-Exam)	Course Year	2026 - 2027	Semester	6
C314.1	Use Open Educational Resources (OER) after their evaluation				
C314.2	Use copyright material appropriately.				
C314.3	Implement suitable Creative Common License.				