

SREE NARAYANA GURUKULAM COLLEGE OF ENGINEERING

[Affiliated to APJ Abdul Kalam Technological University, Kerala]
Kadayiruppu P O, Ernakulam, Kerala – 682 311

Department of Naval Architecture and Ship Building Engineering

**BTech in Naval Architecture and Ship Building Engineering
Course Outcomes 2019 - Scheme**

Semester I

Course Code & Course Name	CO No	CO Description
MAT 101 LINEAR ALGEBRA AND CALCULUS	CO1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
	CO2	Compute the partial and total derivatives and maxima and minima of multivariable functions
	CO3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
	CO4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
	CO5	Determine the Taylor and Fourier series expansion of functions and learn their applications.
PHT 110 ENGINEERING CHEMISTRY	CO1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
	CO2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
	CO3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.
	CO4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
	CO5	Study various types of water treatment methods to develop skills for treating wastewater.
EST 110 ENGINEERING GRAPHICS	CO1	Draw the projection of points and lines located in different quadrants
	CO2	Prepare multiview orthographic projections of objects by visualizing them in different positions
	CO3	Draw sectional views and develop surfaces of a given object
	CO4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
	CO5	Convert 3D views to orthographic views
	CO6	Obtain multiview projections and solid models of objects using CAD tools
EST 130 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
	CO2	Develop and solve models of magnetic circuits



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	CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
	CO4	Describe working of a voltage amplifier
	CO5	Outline the principle of an electronic instrumentation system
	CO6	Explain the principle of radio and cellular communication
HUN 101 LIFE SKILLS	CO1	Define and Identify different life skills required in personal and professional life
	CO2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
	CO3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
	CO4	Take part in group discussions
	CO5	Use appropriate thinking and problem solving techniques to solve new problems
	CO6	Understand the basics of teamwork and leadership
CYL 120 ENGINEERING CHEMISTRY LAB	CO1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
	CO2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
	CO3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
	CO4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
	CO5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
	CO6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum
ESL 130 ELECTRICAL & ELECTRONICS WORKSHOP	CO1	Demonstrate safety measures against electric shocks.
	CO2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
	CO3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
	CO4	Identify and test various electronic components
	CO5	Assemble and test electronic circuits on boards
	CO6	Work in a team with good interpersonal skills



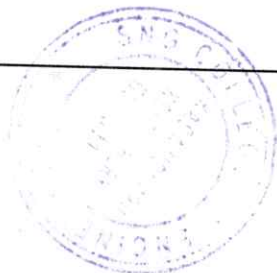
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Semester II

Course Code & Course Name	CO No	CO Description
MAT 102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	CO1	Compute the derivatives and line integrals of vector functions and learn their applications
	CO2	Evaluate surface and volume integrals and learn their inter-relations and applications.
	CO3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
	CO4	Compute Laplace transform and apply them to solve ODEs arising in engineering
	CO5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering
PHT 110 ENGINEERING PHYSICS B	CO1	Compute the quantitative aspects of waves and oscillations in engineering systems.
	CO2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
	CO3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
	CO4	Apply the knowledge of ultrasonics in non-destructive testing and use the principles of acoustics to explain the nature and characterization of acoustic design and to provide a safe and healthy environment
	CO5	Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications
EST 100 ENGINEERING MECHANICS	CO1	Recall principles and theorems related to rigid body mechanics
	CO2	Identify and describe the components of system of forces acting on the rigid body
	CO3	Apply the conditions of equilibrium to various practical problems involving different force system.
	CO4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
	CO5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
EST 120 BASICS OF CIVIL & MECHANICAL ENGINEERING	CO1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
	CO2	Explain different types of buildings, building components, building materials and building construction

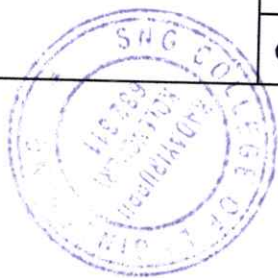


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	CO3	Describe the importance, objectives and principles of surveying.	
	CO4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps	
	CO5	Discuss the Materials, energy systems, water management and environment for green buildings.	
	CO6	Analyse thermodynamic cycles and calculate its efficiency	
	CO7	Illustrate the working and features of IC Engines	
	CO8	Explain the basic principles of Refrigeration and Air Conditioning	
	CO9	Describe the working of hydraulic machines	
	CO10	Explain the working of power transmission elements	
	CO11	Describe the basic manufacturing, metal joining and machining processes	
	HUN102 PROFESSIONAL COMMUNICATION	CO1	Develop vocabulary and language skills relevant to engineering as a profession
		CO2	Analyze, interpret and effectively summarize a variety of textual content
CO3		Create effective technical presentations	
CO4		Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus	
CO5		Identify drawbacks in listening patterns and apply listening techniques for specific needs	
CO6		Create professional and technical documents that are clear and adhering to all the necessary conventions	
EST 102 PROGRAMING IN C	CO1	Analyze a computational problem and develop an algorithm/flowchart to find its solution	
	CO2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.	
	CO3	Write readable C programs with arrays, structure or union for storing the data to be processed	
	CO4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem	
	CO5	Write readable C programs which use pointers for array processing and parameter passing	
	CO6	Develop readable C programs with files for reading input and storing output	



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PHL120 ENGINEERING PHYSICS LAB	CO1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
	CO2	Understand the need for precise measurement practices for data recording
	CO3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
	CO4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics
	CO5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results
ESL 120 CIVIL & MECHANICAL WORKSHOP	CO1	Name different devices and tools used for civil engineering measurements
	CO2	Explain the use of various tools and devices for various field measurements
	CO3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
	CO4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
	CO5	Compare different techniques and devices used in civil engineering measurements
	CO6	Identify Basic Mechanical workshop operations in accordance with the material and objects
	CO7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
	CO8	Apply appropriate safety measures with respect to the mechanical workshop trades



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Semester III		
Course Code & Course Name	CO No	CO Description
MAT201 PARTIAL DIFFERENTIAL EQUATION AND COMPLEX ANALYSIS	CO1	Understand the concept and the solution of partial differential equation.
	CO2	Analyse and solve one dimensional wave equation and heat equation
	CO3	Understand complex functions, its continuity differentiability with the use of CauchyRiemann equations.
	CO4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function
	CO5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals.
SBT 201 INTRODUCTION TO NAVAL ARCHITECTURE	CO1	Discern the role of the Naval Architect in the maritime industry.
	CO2	Explain various types of ships and fundamentals of Naval Architecture that would equip one to define hull forms geometrically and represent them as line plan drawings.
	CO3	Apply the procedures of numerical integration to calculate hydrostatic properties, and plot sectional area curves, Bonjean curves, and hydrostatic curves.
	CO4	Explain the concept the of weight and buoyancy of a ship, and of the various types of materials used for construction of maritime structures, and identify various major and minor structural components of a ship.
	CO5	Discern the general arrangement of propulsion plants, and of the various auxiliary machinery, required for efficient operation of a ship.
	CO6	Explain the various machineries/ equipment, anchoring, mooring and towing operations.
SBT 203 MECHANICS OF SOLIDS	CO1	Assimilate the concepts on stress, strain, modulus of elasticity and the relationship between different elastic constants
	CO2	Draw the bending moment diagram and shear force diagram for various types of beams under different boundary conditions and loading.
	CO3	Calculate the shear stress distribution under various cross –sections
	CO4	Determine principal stresses and maximum shear stress with the aid of equations and Mohr's circle.
	CO5	Conceive the concept on torsion and its applications
	CO6	Solve problems related to buckling of columns and critical buckling.
SBT 205 MECHANICS OF FLUIDS	CO1	Apply the different concepts and properties associated with fluid to solve real world problems.



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	CO2	Apply the fluid kinematics and boundary layer concepts related to fluid flow to solve problems.
	CO3	Analyze the different types of fluid flow, energy, friction and losses through the pipes.
	CO4	Identify the use and limitations of the various equations related to fluid flow and apply it to solve a variety of fluid flow problems
	CO5	Apply fundamental knowledge of mathematics to model and analysis of fluid flow problems in engineering.
	CO6	Develop numerical/graphical solutions for the fluid flow problems in any of the programming language/software (C, C++, Excel, MATLAB etc.).
SBL 201 MECHANICS OF FLUIDS	CO1	Identify major instruments commonly used in the field of fluid mechanics.
	CO2	Identify and practice different experiments in the fluid mechanics domain.
	CO3	Apply the theoretical knowledge gained in the class room with the physical world.
	CO4	Compare different techniques and instruments used in Fluid property measurements.
	CO5	Carry out scientific experiments as well as accurately record and analyze the results of such experiments.
	CO6	Function as a member of a team, communicate effectively and engage in further learning and problem solving.
SBL 203 WELDING AND MACHINE TOOLS LAB	CO1	Machine the given specimen to required dimension using Lathe.
	CO2	Demonstrate the principle of operation of MMAW, TIG and MIG
	CO3	Prepare specified type of joint using various welding processes.
	CO4	Apply the theoretical knowledge gained in the class room with the physical world.
	CO5	Carry out scientific experiments as well as accurately record and analyze the results of such experiments.
	CO6	Function as a member of a team, communicate effectively and engage in further learning and problem solving.
EST 200 DESIGN & ENGINEERING	CO1	Explain the different concepts and principles involved in design engineering
	CO2	Apply design thinking while learning and practicing engineering.
	CO3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
MCN201 SUSTAINABLE ENGINEERING	CO1	Understand the relevance and the concept of sustainability and the global initiatives in this direction



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	CO2	Explain the different types of environmental pollution problems and their sustainable solutions
	CO3	Discuss the environmental regulations and standards
	CO4	Outline the concepts related to conventional and non-conventional energy
	CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles

Semester IV		
Course Code & Course Name	CO No.	CO Description
MAT202 PROBABILITY, STATISTICS AND NUMERICAL METHODS	CO 1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.
	CO 2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena.
	CO 3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population
	CO 4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques
	CO 5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.
SBT202 RESISTANCE AND PROPULSION OF SHIPS	CO 1	Discern various components of resistance of ships
	CO 2	Estimate resistance of ships and effective power using statistical / methodical series / model tests.
	CO 3	Outline the geometry of a screw propeller.
	CO 4	Describe the phenomena of cavitation and its effects on propellers
	CO 5	Design propeller using various methodical series/ design charts/ model experiments.
	CO 6	Explain the principle of operation of various unconventional propulsive devices, and resistance of high speed marine crafts.
SBT204 STABILITY OF SHIPS AND SUBMARINES	CO 1	Discern the various equilibrium conditions pertaining to the stability of ships and underwater vessels, the effects on stability due to various external and internal factors.

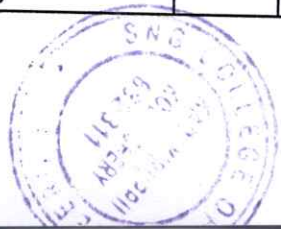


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	CO 2	Explain the stability of ships, for small and large angles of inclination
	CO 3	Discern the purpose of an inclining experiment, and the process procedures involved in it
	CO 4	Apply the procedures of numerical integration to ship stability calculation and development of GZ curves.
	CO 5	Explain the concepts of subdivision and floodable length curves and the different methodologies involved for calculating the final damaged equilibrium position and stability.
	CO 6	Explain the contents of ship stability booklet.
	SBT206 ANALYSIS OF STRUCTURES	CO 1
CO 2		Perform step by step procedure involved in Moment Distribution Method.
CO 3		Accumulate knowledge on Principle of Virtual Work; Strain Energy & Complementary Energy.
CO 4		Appreciate the concepts of vibration of continuous system such as rod, string, beam and shaft.
CO 5		Develop basic concepts on methods such as force method and stiffness method.
HUT200 PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.
	CO 2	Adopt a good character and follow an ethical life.
	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues
MCN202 CONSTITUTION OF INDIA	CO 1	Explain the background of the present constitution of India and features.
	CO 2	Utilize the fundamental rights and duties.
	CO 3	Understand the working of the union executive, parliament and judiciary.
	CO 4	Understand the working of the state executive, legislature and judiciary.
	CO 5	Utilize the special provisions and statutory institutions.
	CO 6	Show national and patriotic spirit as responsible citizens of the country
SBL202 SHIP DESIGN LAB	CO 1	Generate lines plan for given offset table and perform fairing



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	CO 2	Generate lines plan for given offset table and perform fairing
	CO 3	Apply the theoretical knowledge gained in the class room with the physical world.
	CO 4	Compute and analyse initial and damage stability results for given conditions
	CO 5	Learn the basics of ship design and carry out various exercises related ship design.
	CO 6	Function as a member of a team, communicate effectively and engage in further learning and problem solving.
	SBL204 MEASUREMENTS LAB	CO 1
CO 2		Analyze the need of precision measurement.
CO 3		Explain the various measurement units used worldwide.
CO 4		Explain the use of various measuring instruments
CO 5		Carry out scientific experiments as well as accurately record and analyze the results of such experiments
CO 6		Function as a member of a team, communicate effectively and engage in further learning and problem solving.

Semester V		
Course Code & Course Name	CO No	CO Description
SBT301 SHIP DYNAMICS	CO 1	Develop the understanding of concepts of Seakeeping and Manoeuvring.
	CO 2	Use the basic concept of wave spectrum to ship response calculations.
	CO 3	Relate the various dynamic responses of ship to irregular sea waves.
	CO 4	Evaluate the controllability of a ship
	CO 5	Acquire knowledge on Hydrodynamic derivatives and Rudder Design.
	CO 6	Understand the ship design considerations for Seakeeping and Manoeuvring.
SBT303 STRUCTURAL DESIGN OF SHIPS	CO 1	Acquire knowledge on shipbuilding materials and their properties, transition from wood to modern day metallic and non metallic materials
	CO 2	Acquire knowledge on Classification Societies, Rules promulgated by class societies, Longitudinal Strength, Transverse Strength, Local Strength.

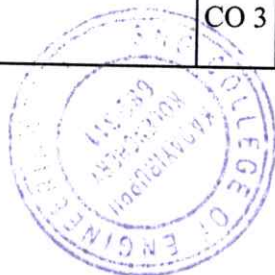


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	CO 3	Understand the concepts such as longitudinal framing system, transverse framing system, combined framing system, basic structural components - primary stiffeners, secondary stiffeners, stringers, brackets
	CO 4	Understand the ship structure anatomy – Bottom structure, side structure, shell expansion, deck structure, bulkheads, tanks, end structures. Understand structural response of ships to various loads.
	CO 5	Acquire knowledge of ship structural drawing standards, apply class rules for structural design
	CO 6	Acquire knowledge of structure of specialised vessels
	CO 7	Preparation of practical ship drawings
	SBT305 STRENGTH OF SHIPS-I	
	CO 1	Explain the various types of loads acting on ship structure in a seaway.
CO 2	Explain the global response of hull girder in terms of longitudinal bending and shear.	
CO 3	Analyse transverse section of a ship using Moment Distribution Method and Matrix methods.	
CO 4	Explain the development of wave bending moment and torsional moment in a seaway.	
CO 5	Understand the design of longitudinal, transverse and corrugated bulkheads.	
SBT307 ELECTRICAL TECHNOLOGY AND INSTRUMENTATION		
CO 1	Discern the basic working principle, construction, types, performance characteristics and applications of DC generators.	
CO 2	Discern the basic working principle, construction, types, performance characteristics and applications of DC motors.	
CO 3	Compare the basic working principle, construction, types, performance characteristics and applications of AC and DC machines.	
CO 4	Explain the basic working principle, construction, types, losses, efficiency and applications of transformers.	
CO 5	Identify the basic principles of instrumentation, measurement standards and types of errors in instruments and measurements.	
MCN 301 DISASTER MANAGEMENT		
CO 1	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle (Cognitive knowledge level: Understand).	
CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand).	
CO 3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand).	

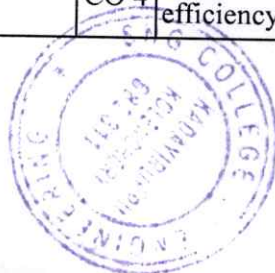


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	CO 4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community (Cognitive knowledge level: Apply)
	CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand).
	CO 6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand).
HUT 310 MANAGEMENT FOR ENGINEERS	CO 1	Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).
	CO 2	Describe the functions of management (Cognitive Knowledge level: Understand).
	CO 3	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand).
	CO 4	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply).
	CO 5	Summarize the functional areas of management (Cognitive Knowledge level: Understand).
	CO 6	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).
SBL331 STRENGTH OF MATERIALS LAB	CO 1	Apply knowledge in the area of testing of materials and components of structural elements experimentally.
	CO 2	Able to note down relevant readings and perform calculations while an experiment is in progress thereby correlating theoretical concepts of materials and their practical implications.
	CO 3	Understand with the arrangement and conduct of experiments in the Material Testing laboratory environment.
	CO 4	Able to comprehend the factors responsible for variation between theoretical and experimental results pertaining to the domain of Material Science.
	CO 5	Undertake the testing of materials when subjected to different types of loading.
SBL333 MARINE HYDRODYNAMICS AND HYDRAULIC MACHINERIES LAB	CO 1	Discern the basic working principle, construction, types, performance characteristics and applications of DC generators.
	CO 2	Discern the basic working principle, construction, types, performance characteristics and applications of DC motors.
	CO 3	Compare the basic working principle, construction, types, performance characteristics and applications of AC and DC machines.
	CO 4	Explain the basic working principle, construction, types, losses, efficiency and applications of transformers.



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	CO 5	Identify the basic principles of instrumentation, measurement standards and types of errors in instruments and measurements.
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Semester VI		
Course Code & Course Name	CO No	CO Description
SBT302 SHIP DESIGN- I	CO 1	Discern various techno-economical aspects in ship design.
	CO 2	Explain various design methodologies which are being used in design of ships.
	CO 3	Explain the types of ships and specific design approaches followed in their design.
	CO 4	Apply the ship design methodologies to develop hull forms of typical merchant ships.
	CO 5	Understand the regulations pertinent in ship design.
SBT304 STRENGTH OF SHIPS - II	CO 1	Understand the different types of plates and the various theories associated with it.
	CO 2	Carry out bulkhead analysis and understand how buckling occurs in shells.
	CO 3	Find shear centre and shear flow for beams with different cross-sections.
	CO 4	Perceive the different types of limit state analysis
	CO 5	Differentiate between launching, docking, grounding and collision.
	CO 6	Explain damped and undamped vibrations.
SBT306 MARINE ENGINEERING	CO 1	Understand the relation between Marine Engineering and Naval Architecture.
	CO 2	Demonstrate knowledge of various marine machineries and systems onboard ships.
	CO 3	Understand importance of various marine machineries onboard ships.
	CO 4	Understand the working of various deck machineries and steering systems.
	CO 5	Make efficient Engine Room Arrangement while considering the IMO/MARPOL regulations.
HUT 300 INDUSTRIAL ECONOMICS AND FOREIGN TRADE	CO 1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand)
	CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
	CO 3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)



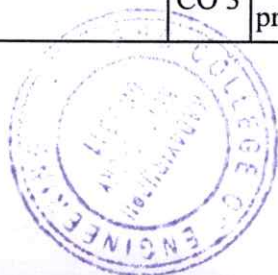
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	CO 4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse)
	CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)
SBT308 COMPREHENSIVE COURSE WORK	CO 1	Learn to prepare for a competitive examination
	CO 2	Comprehend the questions in Naval Architecture field and answer them with confidence.
	CO 3	Communicate effectively with faculty in scholarly environments
	CO 4	Analyze the comprehensive knowledge gained in basic courses in the field of Naval Architecture and Shipbuilding Engineering.
SBL332 CAD/ CAM LAB	CO 1	Familiar in 3D Modelling with at least one CAD Package.
	CO 2	Familiar with FEA of simple structures/ components.
	CO 3	Able to understand and model the different types of joints, valves, coupling methods etc
	CO 4	Familiar with the user interface of design and analysis software
	CO 5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
	CO 6	Function as a member of a team, communicate effectively and engage in further learning and problem solving.
SBL334 ELECTRICAL ENGINEERING LAB	CO 1	Understand the setting up of various experiments in an electrical engineering laboratory environment.
	CO 2	Carryout load test on DC machines and evaluate their performance.
	CO 3	Carryout load test on AC motors and evaluate their performance
	CO 4	Carryout load test on transformers and evaluate their performance.
	CO 5	Apply the theoretical knowledge gained in the class room with the physical world.

Semester VII		
Course Code & Course Name	CO No	CO Description
SBT401 SHIP DESIGN - II	CO 1	Understand the rules and regulation and apply the methodology and tools used in the ship design process and to develop general arrangement of ship.
	CO 2	Acquire the knowledge for safe design and operation of cargo handling, Anchor and mooring arrangements within the ship design process.
	CO 3	Identify and apply statutory regulations and classification rules in providing accommodation and access



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	CO 4	Convey the knowledge of lightings and other signal arrangements meeting statutory regulations and classification rules.
	CO 5	Demonstrate knowledge and understanding of various fire protection arrangements and other supporting equipments.
	CO6	Discern information's of Life-saving and Fire-fighting arrangements for a new ship design meeting regulations.
SBT443 SHIP PRODUCTION	CO 1	Understand various types of shipyard layouts, material handling systems, production management methodologies in modern shipbuilding.
	CO 2	Elucidate various types of surface preparation techniques, equipment used for surface preparation, their advantages and limitations.
	CO 3	Explain various types of plate and frame cutting and bending techniques
	CO 4	Discern the various assembly techniques, welding symbols and standards used in shipbuilding
	CO 5	Understand and illustrate various processes involved in shipbuilding, and installation of various equipment and systems in ships.
	CO6	Explicate the various types of outfitting and launching methodologies adopted in modern shipbuilding.
MCN401 INDUSTRIAL SAFETY ENGINEERING	CO 1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)
	CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand)
	CO 3	Explain different issues in construction industries. (Cognitive Knowledge level: Understand)
	CO 4	Describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand)
	CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)
SBL411 MARINE ENGINEERING LAB	CO 1	Explain the importance of various machinery parts
	CO 2	Familiar with various machineries used in the ship.
	CO 3	Dismantle & Assemble Various Marine Auxiliary Machineries.
	CO 4	Analyse the results to understand the performance characteristics of engines.
	CO 5	Learn about the advanced technologies and research areas in engines.
SBQ413 SEMINAR	CO 1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply)
	CO 2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
	CO 3	Prepare a presentation about an academic document (Cognitive knowledge level: Create).
	CO 4	Give a presentation about an academic document (Cognitive knowledge level: Apply).



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BD415 PROJECT PHASE I	CO 5	Prepare a technical report (Cognitive knowledge level: Create).
	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
	CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO 5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
	CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).

Semester VIII

Course Code & Course Name	CO No	CO Description
SBT402 OFFSHORE STRUCTURES	CO 1	Understand the basic concepts of offshore engineering by being familiar with different types of structures their functions and applications
	CO 2	Explain ocean wave properties, wave theories and their applicability regime
	CO 3	Acquire a basic understanding of the sea loads (wind, wave & current) acting on offshore structures and their applicability regime.
	CO 4	Demonstrate the various offshore design process.
	CO 5	Identify and list the function of the different components of conventional offshore structures.
	CO 6	Illustrate different methods of offshore installations.
SBT414 JOINING TECHNIQUES IN SHIPBUILDING TECHNOLOGY (PROGRAM ELECTIVE III)	CO 1	Explain types of welding, welding process and welding parameters used in shipbuilding.
	CO 2	Identify the GMAW, its process and different types of metal transfers.
	CO 3	Elucidate various welding process that are used in production shop and in building berths.
	CO 4	Classify the welding defects, destructive tests and its classifications and explain WPS, WPQ and WPQR related to quality control of welding.

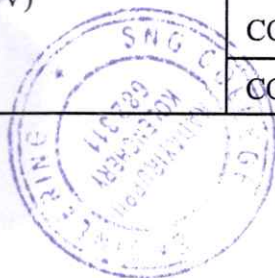


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SBT424 SHIP PRODUCTION MANAGEMENT (PROGRAM ELECTIVE III)	CO 5	Explain application of Robotic welding in shipbuilding.
	CO 1	Understand a typical shipyard organization and components of integrated approach in planning ship production.
	CO 2	Apply knowledge and understanding of various machining process in fabrication of prepared plates from storage area to units
	CO 3	Understand the practice of prefabrication prior to erection and sequence of erection of hull.
	CO 4	Demonstrate knowledge and understand various technologies involved during erection of hull.
	CO 5	Apply CPM and PERT on production management
SBT444 ELECTRICAL SYSTEMS IN SHIPS AND SHIPYARDS (PROGRAM ELECTIVE III)	CO 1	Understand various types of Systems and Major Components, Load Analysis, Power Management Systems.
	CO 2	Identify the general alternators, specific systems for distribution of AC power in Ships, emergency power and shore supply
	CO 3	Explain the various types of DC generators and types of starters.
	CO 4	Explain the performance requirements of alternators, thyristor-based static automatic voltage regulator and effect of kW loading.
	CO 5	Elucidate the layout and principle of electrical propulsion, advantages & disadvantages of electrical propulsion and turbo-electric propulsion.
SBT416 SHIP SURVEY ESTIMATION AND REPAIR (PROGRAM ELECTIVE IV)	CO 1	understand various types of surveys and certifications concerning ship design, Construction and Operation.
	CO 2	identify various types of repair works carried out onboard ships and their monitoring and certification by survey agencies.
	CO 3	Compare the difference in class rules of various classification societies
	CO 4	Explain types of dry docks, drydocking procedure for various vessels, different inspections and repairs performed during dry docking
	CO 5	use the different techniques for the preliminary cost estimation and work estimation in design, dry docking and repair of ships.
SBT428 OCEAN WAVE HYDRODYNAMICS (PROGRAM ELECTIVE V)	CO 1	Recollect the basics of fluid dynamics
	CO 2	Convey the science behind the formation of ocean waves. Analyze the properties of water particle under progressive waves. Apply the knowledge to solve numericals on wave power and wave energy.
	CO 3	Identify the force regime to be considered for wave load calculation
	CO 4	Acquire knowledge about different stages of wave deformation
	CO 5	Differentiate the concept of wave theories



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	CO 3	Identify the force regime to be considered for wave load calculation
	CO 4	Acquire knowledge about different stages of wave deformation
	CO 5	Differentiate the concept of wave theories
	CO 6	Understand different methods of wave data collection and wave data analysis
SBT438 COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING (PROGRAM ELECTIVE V)	CO 1	Understand the fundamentals of design process, CAD -CAM- CIM and to familiarise various Naval Architecture software packages used in the industry
	CO 2	Explain the basic functioning of Numerically Controlled Machine tools, its need and its application.
	CO 3	Develop simple part programs using both manual as well as computer aided part programming methods
	CO 4	Identify the need of computer aided process planning, Group Technology and Flexible Manufacturing Systems in manufacturing environment.
	CO 5	Explain the basic components of robots, its driving mechanism and its application in different field.
SBD416 PROJECT PHASE II	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
	CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO 5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
	CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).

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