

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology			Branch/Spec.	Marine Engineering				
Semester	IV			Version	2.0.0.0				
Effective from Academic Year		2015-16		Effective for the batch Admitted in			July 2014		
Subject code	2MR401		Subject Name	Alternators & Motors					
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	0	1	0	3	Theory	40	60	100
Hours	2	0	2	0	4	Practical	25	25	50
Pre-requisites:									
Learning Outcome:									
After successful completion of the course, student will be able to									
<ul style="list-style-type: none"> • Comply with the TAR Book Competency number 6.1.1a 									
Theory syllabus									
Unit	Content								Hrs
1.	Three phase induction motor: <ul style="list-style-type: none"> • Principle of operation and theory of action, slip speed, rotor to stator relationship, rotor frequency, rotor e.m.f. and current, • Equivalent circuit relationship between rotor IR loss and the rotor slip, torque/slip characteristics, starting torque and maximum running torque, reversing, speed control of induction motor, including IGBT (Insulated Gate Bipolar Transistor) and Thyristor controls, • Starting of induction motor, method of starting D.O.L, Star/Delta, Auto, Testing of motor, use of circle diagram. Single and three phase induction motor principle and operational characteristics, starting control constructional details. 								13
2.	Alternators-general <ul style="list-style-type: none"> • arrangement of alternators, construction of salient pole and cylindrical- rotor types, • Types of stator windings, single and double layer windings, e.m.f equation of an alternator, distribution and pitch factor, waveform of generated e.m.f., alternator on load, percentage regulation, internal voltage drop, production of rotating magnetic field, • Resultant magnetic field distribution, mathematical derivation of the rotating field condition, magneto motive force or ampere-turn waveform distribution, reversal of direction of rotation of rotating field. 								13
3.	Armature reaction in synchronous alternator: <ul style="list-style-type: none"> • armature reactance, prediction of voltage regulation, open circuit test, short circuit test, synchronous impedance, torque/angle characteristics, infinite busbar, synchronizing current, torque and power, hunting of phase swinging, parallel operation of alternators, a.c. generators in parallel-excitation control, throttle control, load sharing KW and KVA, principle of action of three phase synchronous motor effect of varying load and excitation, methods of starting, advantages and disadvantages of synchronous motor. 								10
TOTAL								36	

Practical content

(A.C. Circuits and Machines):

- Perform No Load and Blocked Rotor Test on single phase induction motor to determine the equivalent circuit parameter of given induction motor
- Perform No Load and Blocked Rotor Test on three phase induction motor to obtain the performance characteristics using circle diagram
- Obtain the Slip-Torque characteristics and efficiency curve of 3 phase Induction Motor from circle diagram
- To find performance of 3 phase Induction Motor on No Load condition
- To determine the voltage regulation of an Alternator by Synchronous Impedance method
- To obtain load characteristics of an Alternator by performing Direct Load Test & Determine Voltage regulation.
- To Obtain 'V' curve of a synchronous Motor at No Load
- To Study the parallel operation & synchronizing of Alternator
- To study the different Methods of starting of induction motor
- Study the speed control method of induction Motor

Text Books

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|---|--|
| 1 | A Text Book of Electrical Technology Vol 2 -B L Thareja& A K Thareja |
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Reference Books

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| 1 | Electrical Technology - Hughes Edward |
| 2 | Electric Machine - Ashfaq Husain |

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Bachelor of Technology				Branch/Spec.	Marine Engineering			
Semester	IV				Version	2.0.0.0			
Effective from Academic Year				2015-16		Effective for the batch Admitted in			July 2014
Subject code	2MR402		Subject Name		Engineering Materials				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total	CE	SEE	Total	
	L	TU	P	TW					
Credit	3	0	0	0	3	Theory	40	60	100
Hours	3	0	0	0	3	Practical	0	0	0
Pre-requisites:									
Learning Outcome:									
After successful completion of the course, student will be able to									
<ul style="list-style-type: none"> Comply with the TAR Book Competency number 8.1, 9.9 & 9.10 									
Theory syllabus									
Unit	Content								Hrs
1.	Structure of Atom: <ul style="list-style-type: none"> Electrons and Bonding; Wave Mechanics and electronic behaviors; Electronic structure of atoms; Covalent bonding; Metallic bonding; ionic bonding and Secondary bonding. Atomic packing-directionally and non-directionally bonded atoms; Crystal structure-Space lattices; Ionic and molecular crystals; Interfacing in crystals-Points; line, surface and volume imperfections; Non-crystalline solids; Elastomers; Long chain and molecular compounds and three dimensional network 								9
2.	Metals and Alloys: <ul style="list-style-type: none"> Different types of iron and steel; their manufacture, properties and uses in industry. Alloys of iron and steel. Non-ferrous metals and alloys. Properties and uses; Miscellaneous engineering materials; their properties and uses. 								6
3.	Miscellaneous Engg. Materials: <ul style="list-style-type: none"> Refractoriness, Insulating materials; Plastics and Rubber; PVC, Resins, Adhesives and Bonding Plastics, Paints. Manufacture, properties and selection for various engineering applications. Polyurethane foam. 								5
4.	Testing of Materials: <ul style="list-style-type: none"> Destructive Tests: Tensile Test; Compression Test; Hardness Test; Bend Test; Torsion Test & Impact Test. Non-destructive Tests: Magnetic Particle Test; Fluorescent Test; Ultrasonic Test, Radiography Test. 								6
5.	Solid Solution: <ul style="list-style-type: none"> Properties of solid solutions and alloys. Types of Binary alloys, Thermal Equilibrium Diagrams, Cooling curves, Eutectic and paratactic alloys, Intermetallic compounds. Allotropy of Iron, Iron-carbon Equilibrium diagrams, T-T-T curve, Equilibrium Diagrams for Ferrous and Non-ferrous metals and alloys 								6

6.	Heat Treatment: <ul style="list-style-type: none"> Heat treatment principles and processes and purposes for Ferrous and non-ferrous metals and alloys. Effect on structures and properties. Deformation and Fracture of materials in services. . 	6
7.	Fatigue & Creep: <ul style="list-style-type: none"> Fatigue loading, Mechanisms of fatigue, fatigue curve, Fatigue tests. Design criteria in fatigue, Corrosion fatigue. Stress concentration. Creep phenomena and creep-resisting alloys. Creep curve. Short time and long time creep tests. Development of creep resisting alloys. 	6
8.	Corrosion and its prevention: <ul style="list-style-type: none"> Mechanism of corrosion, Thermodynamics & kinetics of corrosion, Chemical corrosion Electrochemical corrosion, Anodic and Cathodic protection, Forms of metallic coatings. Anodizing, Phosphate. 	4
9.	Uses of materials in shipboard application: <ul style="list-style-type: none"> Chromium, Ceramic, Titanium, PTFE in Shipboard Systems. Characteristics of above materials. 	3
10.	Selection of Materials in Shipbuilding & Marine Engineering: <ul style="list-style-type: none"> Boilers, Steam and Gas turbine, Purifiers and Diesel engine components, Pumping Machinery, Components and Piping System, Engine seating. Propellers and Rudders. Composition, strength value and other requirement for materials used. 	3
	TOTAL	54
Practical content		
<ul style="list-style-type: none"> To conduct IZOD impact test on impact test machine and calculate value of energy absorbed. Calculate Hardness of a Material on Brinnel's Hardness Testing Machine. Determination of behavior of ductile materials when subjected to torsion and to obtain (i) Maximum Torsion Stress, Modulus of Rigidity and Plotting of curve of Angle of Twist v/s Torque. To determine the stiffness of springs for round wire and Square section wire when subjected to compression. To study grain structure of various ferrous & Non Ferrous material under microscope. To conduct Dye Penetrate Test for detection of crack in material. To conduct Magnetic Particle test for crack detection. To conduct flaw detection test by Ultrasonic Equipment. To study behavior of a material under fatigue on Fatigue testing machine. To prepare a report on use of material in shipbuilding & Marine Engineering 		
Text Books		
1	Material Science & Metallurgy - O.P.Khanna	
Reference Books		
1	Metallurgy for Engineers - E. C. Rollason	
2	Pounder's Marine Diesel Engines - Doug Woodyard	
3	Material Science - Hazra - Chaudhary	

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Bachelor of Technology			Branch/Spec.		Marine Engg.		
Semester		IV			Version		2.0.0.0		
Effective from Academic Year		2019-2020			Effective for the batch Admitted in			July 2018	
Subject code		2BS4103		Subject Name		Mathematics for Marine Engineering			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	1	0	0	4	Theory	40	60	100
Hours	3	1	0	0	4	Practical	0	0	0
Pre-requisites:									
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Learning Outcome:									
On successful completion of the subject, students should be able to									
<ul style="list-style-type: none"> • Express physical phenomenon in Fourier Series. • Solve Numerical Differentiation & Integration. • Use basic knowledge of Correlation & Regression and their applications in Marine Engg to cater various problems 									
Theory syllabus									
Unit	Content								Hrs
1	Fourier Series: Definition of periodic function, Euler's formula, Functions having points of discontinuity, Change of intervals, Odd and Even functions, Expansion of odd or even periodic functions, Half range sine and cosine series, Elements of harmonic analysis.								08
2	Finite Difference and Interpolation : Differences, forward difference, backward difference, Interpolation, Newton's Forward difference interpolation formula, Newton's backward difference interpolation formula, Lagrange's interpolation formula for Un-equal intervals, Newton's divided difference formula.								04
3	Numerical differentiation and integration : Taylor's series method, Euler's method, Picard's method, Runge-Kutta Second order method , Runge-Kutta Fourth order method, Trapezoidal rule, Simpson's one third & three by eight rules.								10
4	Ordinary Differential Equation (Higher Order) : Ordinary differential equation with constant coefficient, variation of parameter methods, Cauchy – Euler differential equations, simultaneous differential equations with constant coefficient, applications of ordinary differential equation.								10
5	Correlation & Regression: Definition of Correlation, Types of Correlation, Scatter Diagram Method, Karl Person's Correlation Coefficients, Probable error for Correlation Coefficients, Rank Correlation Co-efficient. Definition of Regression, Regression lines, Regression Coefficients, Properties of regression Coefficients, and Fitting of regression lines and estimation for Bivariate frequency distribution.								09

6	Sampling Theory : Population and Sample, Sampling with & without replacement, Random samples, Population parameters, Sample statistics, Samples mean, Sampling distribution of means, Sample variance, Mean, variance and moments for grouped data.	04
Assignments and tutorials are based on the above syllabus.		
Text Books		
1.	Higher engineering mathematics. By B.S.Grewal.	
2.	Textbook of engineering mathematics By A.B.Mathur and V.P.Jaggi.	
3	Advanced engineering mathematics By Erwin Kreyzing	
4	Textbook of Ordinary and Partial Differential Equations By M.D.Raisinghania.	
Reference Books		
1.	Dr. K. R. Kachot, “Higher Engineering Mathematics”, Vol.2, Mahajan Publication.	
2	Engineering mathematics. By Srivastava.	
ICT/MOOCs		
1.	https://nptel.ac.in/courses/111105035/27	
2.	https://nptel.ac.in/courses/111107062/	
3.	https://nptel.ac.in/courses/111107062/18	
4.	https://nptel.ac.in/courses/111107062/28	
5	https://nptel.ac.in/courses/102101056/11	
6	https://nptel.ac.in/courses/111104031/8	

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Bachelor of Technology			Branch/Spec.		Marine Engineering		
Semester		IV			Version		2.0.0.0		
Effective from Academic Year				2015-16		Effective for the batch Admitted in			July 2014
Subject code		2MR404		Subject Name		Heat Engines			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	0	0	3	Theory	40	60	100
Hours	3	0	0	0	3	Practical	0	0	0
Pre-requisites:									
Learning Outcome:									
After successful completion of the course, student will be able to									
<ul style="list-style-type: none"> Comply with the TAR Book Competency number 4.1.2, 4.1.3 									
Theory syllabus									
Unit	Content								Hrs
1.	Steam turbines: <ul style="list-style-type: none"> Compounding of steam turbine - pressure compounding velocity compounding and pressure velocity compounding of Impulse turbines, conditions for, maximum Energy transfer in above cases, Impulse-reaction and parson's turbine. Degree of reaction, condition for maximum Energy transfer in Reaction turbines, Stage efficiency, overall efficiency and reheat factor, condition curve. Gearing and Lubrication System. Stresses acting on marine steam turbine 								12
2.	Vapor Power cycles: <ul style="list-style-type: none"> Carnot's cycle, Rankin Cycle, Modified Rankin Cycle, superheat cycle, reheat cycle, regenerative cycle, Binary vapor cycle and its effect on Thermal Efficiency, Steam machinery plants, combined steam & gas plant. 								7
3.	Gas Turbine Plants: <ul style="list-style-type: none"> Constant volume or Explosion cycle Gas Turbine plant, constant pressure cycle or Joule Brayton cycle Gas turbine plant simple C-B-T cycle, condition for maximum work output and thermal efficiency in simple cycle. Methods of improvement of Thermal Efficiency and work ratio of Gas Turbine plants. C-B-T-H cycle, complex cycles, closed cycle operation of Gas turbine plants, their merits and demerits. Gearing and Lubrication System. Stresses acting on marine steam turbine 								12

4.	Centrifugal Compressor: <ul style="list-style-type: none"> Principle of centrifugal compression and pressure rise in centrifugal compressor, change in Angular Momentum. Pre-whirl and pre-whirl vanes. Mach number at inlet to a centrifugal compressor, slip and slip factor, multi-stage centrifugal compressor. 	5
5.	Heat conduction, Convection and Radiation: <ul style="list-style-type: none"> Fourier's law of heat conduction, effect of temperature on thermal conductivity of metals, refractory and building materials, liquid and gases, derivation of generalized equation in Cartesian coordinates. One dimensional steady state conduction through plane and composite walls, hollow and composite cylinders, hollow and composite spheres Radiation heat exchange Radiation heat exchange between black bodies, shape factor, heat exchange between non-black bodies- infinite parallel planes and infinite long concentric cylinders, radiation shield, heat exchange between two grey surfaces, electrical analogy. Types of fin, heat flow through rectangular fin Types of fin, heat flow through rectangular fin, infinitely long fin, fin insulated at the tip and fin losing heat at the tip, efficiency and effectiveness of fin, Biot number, Estimation of error in temperature measurement in a thermometer well. 	18
TOTAL		54
Practical content		
Text Books		
1	Engineering Thermodynamic. - D.S.Kumar	
Reference Books		
1	Heat engines - P. L. Ballaney	
2	Thermodynamics applied to Heat engines - E. H. Levitt	
3	Applied Thermodynamics for Engineering Technology -T. D. Eastop& A. McConkey	
4	Applied Thermodynamics - J. B. O. Sneed& S. V. Karr.	
5	Tanker Safety Guide Liquefied Gas - International Chamber of Shipping	

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Bachelor of Technology				Branch/Spec.		Marine Engineering	
Semester		IV				Version		2.0.0.0	
Effective from Academic Year				2015-16		Effective for the batch Admitted in			July 2014
Subject code		2MR405		Subject Name		Theory of Machines			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	25	25	50
Pre-requisites:									
Learning Outcome:									
After successful completion of the course, student will be able to									
<ul style="list-style-type: none"> Basic Mechanisms, Kinematics and Link-Mechanisms & Dynamics of Rotation 									
Theory syllabus									
Unit	Content								Hrs
1.	Basic Mechanisms: <ul style="list-style-type: none"> Mechanisms and machines, kinematics pair, elements, chains and inversions, Degrees of freedom, movability, Grubler's criterion, four link mechanisms, Grashof's criteria. 								4
2.	Kinematics and Link-Mechanisms: <ul style="list-style-type: none"> Relative motion between bodies moving in different planes. Instantaneous center method; Rubbing velocities at pin joints. Graphical construction for relative velocity and acceleration in different link and sliding mechanisms. Analytical determination of velocity and acceleration. Forces in Crank and connecting rods. Inertia force on link connecting rods. Effect of friction. 								8
3.	Dynamics of Rotation : <ul style="list-style-type: none"> Dynamics of rotation panicle and rotating bodies, velocity and acceleration in terms of path variables, cylindrical co-ordinates forces acting on a body having known motion; Torque equation; Work done by application of torque; Kinetic energy of rotation. Total Kinetic energy of a rolling wheel. 								6
4.	Turning Moment & Flywheel: <ul style="list-style-type: none"> Function of a Flywheel. Crank effort diagrams. Fluctuation of speed and energy. Effect of centrifugal tension on flywheel. Inertia torque and its effects on Crank Effort diagrams. Governors: Function of Governor; Comparison between a Governor and a fly wheel; various types of Governors; Centrifugal and Inertia types of Governors, Sensitiveness; 								10

	Stability and Hunting of Governors; Governor Effort and Power, Consideration of friction in Governors.	
5.	Cams: <ul style="list-style-type: none"> Types of cams and followers. Specified motion of followers. Uniform acceleration and deceleration, S.H.M. and uniform velocity Graphical construction of Cam-profile. Analytical design procedure for cams with Straight flank, Curved flank, Circular flank with various types of followers Spring force and Reaction Torque. In-line cams and off center cams. 	7
6.	Drives and Brake: <ul style="list-style-type: none"> Belt and Rope drives; Open and Cross Belt drive; Belt dimensions; Ratio of belt tension; Modification for V-groove pulleys; Power of Belt drives and maximum power transmitted. Effect of Centrifugal tension; Creep in Belts; Different types of band brakes and block brakes. Dynamometers and their working principles; Absorption Dynamometer Band & Rope Brake Dynamometer, Hydraulic Dynamometer. 	8
7.	Spur Gearing : <ul style="list-style-type: none"> Various definition e.g. p.c.d. profile of gear teeth, module, path of contact, velocity of sliding Interference, Gear ratio and center distance of simple and compound gear trains. Toothed gearing: Types of gears, conditions for transmission of constant velocity ratio; methods of avoiding interference; Transmission of power by gear trains on parallel shafts; Rack and pinion. Bevel gears, Worm and Worm wheel. Spur gear helical gears, Spiral gears; Epicycle gear trains. Torque on gear trains, acceleration of gear trains. 	11
	TOTAL	54
Practical content		
<ul style="list-style-type: none"> To measure circular and linear displacements of cam and follower in case of Plate cam-Reciprocating follower Tangent cam-with roller oscillating follower and plot the displacement curves hence differentiate the velocity and accelerating curves. Centrifugal clutch to demonstrate the process of Power parameters of the Hartnell Governor. Rotating masses, Spring Rate, Initial Spring Compression. <p>Note: The effects of varying the mass of the centre sleeve of the Porter Governor and Compare the same with that of Proell Governor.</p> <ul style="list-style-type: none"> To determine the characteristic curves of sleeve position against speed of rotation in case of: Hartnell Governor, Porter Governor and Proell Governor To determine the moment of inertia of different bodies by the Trifilar suspension by experiment and by calculation 		
Text Books		
1	Theory of Machines	- R. S. Khurmi
Reference Books		
1	Theory of Machines	- P. L BaUaney
2	Applied Mechanics	- J. Hannah & M.J. Hillier
3	Engineering Mechanics	- H, L. Langhaar & A. P. Borese
4	Theory of Machines	- R. S. Ratan

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FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Bachelor of Technology			Branch/Spec.		Marine Engineering		
Semester		IV			Version		2.0.0.0		
Effective from Academic Year			2015-16		Effective for the batch Admitted in			July 2014	
Subject code		2MR406	Subject Name		Fluid Mechanics & Hydraulics				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	0	1	0	3	Theory	40	60	100
Hours	2	0	2	0	4	Practical	25	25	50
Pre-requisites:									
Learning Outcome:									
After successful completion of the course, student will be able to									
<ul style="list-style-type: none"> Comply with the TAR Book Competency number 4.5, 5.1 & 9.7 									
Theory syllabus									
Unit	Content								Hrs
1.	Properties of fluid: <ul style="list-style-type: none"> Types of fluid, law of continuum, properties of fluid-surface tension, cohesion & adhesion, viscosity & its measurement- rotating viscometer, capillarity, bulk modulus of elasticity, compressibility, vapor pressure and cavitations. 								2
2.	Fluid static: <ul style="list-style-type: none"> Pressure & its measurement, hydrostatic law, hydrostatic forces on submerged surfaces vertical, horizontal, inclined & curved surface, Variation of forces with depth, buoyancy and floatation, Centre of pressure on a rectangular vertical plane surface or triangular plane surface, both with one edge parallel to the surface of the liquid, metacentric height, stability of immersed and floating body. 								7
3.	Fluid Kinematics: <ul style="list-style-type: none"> Types of fluid flow, velocity & acceleration of fluid flow, rate of flow & continuity equation, vortex flows. Full bore flow of liquid through pipes under constant head. Flow through orifice. Flow through pipes, Flow through parallel concentric pipes, Flow through parallel plates, Coefficient of velocity, contraction of area and discharge. Effects on (a) Sounding pipe (b) Air release pipes (c) Stand pipes when containing liquids 								8
4.	Fluid Dynamics: <ul style="list-style-type: none"> Prandtl No. Nussle No., Reynolds No., Stanton No., Grashof No, Graetz No, Natural and Forced Convection. Control volume & Control surface, Euler's equation, Bernoulli's equation and its applications. Flow rate measurement-Venturimeter, Orificemeter&Pitot tube. - Compressible flow: - velocity of sound, mach no & mach cone. 								8

5.	Fluid Machines: <ul style="list-style-type: none"> • Impulse momentum principal force exerted by a jet on flat plate, hinged flat plate, moving flat plate, curved and pipe bend. Surge Pressure and control • Blade diagram for centrifugal pump 	4
6.	Hydraulic Turbines: <ul style="list-style-type: none"> • Impulse reaction turbine, pelton wheel, Francis, propeller & Kaplan turbine, effective head, available power & efficiencies for above turbines, draft tube, specific speed of turbine, cavitation, performance characteristics of turbines 	7
	TOTAL	36
Practical content		
<ul style="list-style-type: none"> • Buoyancy Experiment - Metacentric Height • Measurement of flow using Pitot tube, flow meter, flow nozzle Bernoulli's equation-Venturimeter. • To verify the Bernoulli's theorem with help of given apparatus. • To determine coefficient of discharge of venturimeter and orificemeter. • To determine friction losses through pipes. • To determine coefficient of discharge of through notches and weirs. • To study the performance characteristics of a constant speed centrifugal pump, specific speed. Performance characteristics of multistage pump. • To study about the Positive discharge pumps • To find the Characteristics of Impulse and Reaction Turbine Specific speed and unit quantities. • Demonstrate of Hydraulic and Pneumatic system. • Perform testing of pelton Wheel 		
Text Books		
1	Fluid Mechanics & Machine	-by R.K. Bansal
Reference Books		
1	Fluid Mechanics by	-YunusCengel.
2	Fluid Mechanics & Machine	-by K.R. Arora
3	Fluid Mechanics & Hydraulic Machines	- R.K. Rajputh

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Bachelor of Technology			Branch/Spec.		Marine Engineering		
Semester		IV			Version		2.0.0.0		
Effective from Academic Year			2015-16		Effective for the batch Admitted in			July 2014	
Subject code		2MR407		Subject Name		Marine Auxiliary Machines - I			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	0	0	3	Theory	40	60	100
Hours	3	0	0	0	3	Practical	0	0	0
Pre-requisites:									
Learning Outcome:									
After successful completion of the course, student will be able to									
<ul style="list-style-type: none"> Comply with the TAR Book Competency number 5.2.1, 5.2.2, 5.4 & 9.6 									
Theory syllabus									
Unit	Content								Hrs
1.	General Engine Room Layout: <ul style="list-style-type: none"> Layout of main and auxiliary machinery in engine rooms in different ships. 								3
2.	Layout of Pipe lines : <ul style="list-style-type: none"> Pipe material, Piping arrangement for steam, bilge, ballast and oil fuel systems, emergency operation arrangements, Lube oil and cooling system lines with various fittings. Domestic fresh water and sea water and sea water hydrophore system. Color code of pipelines, Calculation of size of various components and assemblies of marine diesel engine such as pumps, heat exchangers, pipe lines, condenser, exhaust piping. Cargo oil pumping system in oil tankers Preventive action for leakages in pipes - Isolating a section of pipe, clean & prepare joint faces , select appropriate joining material, reassembling and test hydraulically. 								11
3.	Filters and Strainers : <ul style="list-style-type: none"> Difference between Strainers and filters, types of marine filters, different types of filter materials, auto-clean and Duplex filters, Static filters, micro filters. Priming and core maintenance of filters 								4
4.	Pumps and pumping systems : <ul style="list-style-type: none"> Types of pumps for various requirements, their characteristics and application in ships. Centrifugal Pumps, Gear Pumps, Screw Pumps and Reciprocating pumps, Care and Maintenance of pumps. Care and Maintenance of centrifugal pumps – check for wear & wastage of casing, trueness of shaft ,condition of bearing, seals, wear rings & alignment of pump and motor. Care and maintenance of reciprocating pumps- measure of cylinder liner wear , ring gaps , overhaul valve/seats , various links , bushes , relief valve , gland packing etc. Care and maintenance of gear and screw pumps- check clearance and back lashes 								12

	<ul style="list-style-type: none"> Automation and control of pumps & pumping systems, Pump losses & efficiency, NPSH Performance 	
5.	Blowers and Compressors: <ul style="list-style-type: none"> Operational and constructional details of blowers and compressors used on board ships. Uses of compressed air. Air Bottles: Construction, mountings & associated system. Ventilation fans and ducting arrangements for Engine room, Pump room & Cargo spaces. 	4
6.	Evaporators: <ul style="list-style-type: none"> Construction and Operation of different types of evaporators. Fresh Water generators and distillers. Reverse Osmosis process, Conditioning arrangements of distilled water for drinking purpose 	6
7.	Heat Exchangers: <ul style="list-style-type: none"> Tubular and plate type, reasons for corrosion. Tube removal and plugging of tubes Materials used. 	4
8.	Oil Purification: <ul style="list-style-type: none"> Theory of oil purifications, various methods of oil purifications. Use of settling / service tanks & precautions taken before entering / cleaning tanks. Principles of operation and construction of different Centrifuges for heavy fuel and lubricating oil like FOPX system, Self dislodging Uses of Homogenizers. ALCAP system. Importance of LO/FO testing, Method of testing 	10
	TOTAL	54
Practical content		
Text Books		
1	"Marine Diesel Engine", DevenArhana	
Reference Books		
1	Marine Auxiliary machinery	- H.D. McGeorge
2	Marine Engineering Practice	- VikramGokhale& N. Nanda
3	Basic Marine Engineering	- J. K. Dhar

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Marine Engineering
Semester	IV	Version	2.0.0.0
Effective from Academic Year	2015-16	Effective for the batch Admitted in	July 2014
Subject code	2MR408	Subject Name	Workshop Practice - III
Teaching scheme		Examination scheme (Marks)	
(Per week)	Lecture(DT)		Total
	L	TU	
	Practical(Lab.)		
	P	TW	
Credit	0	0	1
Hours	0	0	2
			Theory
			0
			SEE
			0
			Total
			0
			Practical
			25
			25
			50

Pre-requisites:

Learning Outcome:

After successful completion of the course, student will be able to

- Comply with the TAR Book Competency number 1.2, 1.3 and DGS Training Manual Assignments no: 03

Theory syllabus

Unit	Content	Hrs

Practical content

Welding Shop:

- Basics of Welding
- Safety precautions to be taken while welding
- Half V- welding (from Top face)
- Full V-welding (from top face)
- Double V- welding (on opposite faces)
- Half U-welding (from lop face)
- Double U- welding (on opposite faces)
- T-welding (on inner side)
- T-welding (both inner sides)
- T-welding (both outer sides)
- L- Welding (outside comer)
- L-welding (inside comer)
- Angular welding (both sides)

Gas cutting

- Basics of Gas Cutting by using Oxygen and Acetylene
- Safety Precautions
- Cutting of plate

Training Manual Assignments:

Assignment No: 03

Fabrication, Welding, Joining & Cutting

Text Books	
1	Workshop & Technology - by S.K.Hajra Chaudhry
Reference Books	
1	

***** END of Semester IV *****