UNIVERSITY OF MUMBAI
No.UG / 230 of 2008

CIRCULAR :-

A reference is invited to the Ordinances, Regulations and syllabi relating to the Bachelor of Engineering (B.E.) degree course **vide** this office Circular No. UG/401 of 2003 dated 19th August,2003 and the Principals of the affiliated Colleges in Engineering are hereby informed that the recommendation made by the Faculty of Technology at its meeting held on 26th March, 2008 has been accepted by the Academic Council at its meeting held on 15th April, 2008 **vide** item No.4.29 and that, in accordance therewith, the Scheme of examination and syllabi for Second Year (Sem.III &IV) leading to the B. E. degree course for the Marine Engineering is revised as per **Appendix** and that the same has been brought into force with effect from the academic year 2008 – 2009 .

MUMBAI-400 032

10th June, 2008

for REGISTRAR

To,

The Principals of the affiliated colleges in Engineering.

A.C./4.29/15.4.2008

No.UG/230 -A of 2008, MUMBAI-400 032 10th June, 2008

Copy forwarded with compliments for information to :-

1) The Dean, Faculty of Technology,
2) The Chairman, Boards of the Studies in Mechanical Engineering.
3) The Controller of Examinations,
4) The Co-Ordinator, University Computerization Centre,

10/06

for REGISTRAR

10/6

10/6

Copy to :-

The Director, Board of College and University Development, , the Deputy Registrar (Eligibility and Migration Section), the Director of Students Welfare, the Executive Secretary to the Vice-Chancellor, the Pro-Vice-Chancellor, the Registrar and the Assistant Registrar, Administrative sub-center, Ratnagiri for information .

The Controller of Examinations (10 copies), the Finance and Accounts Officer (2 copies), Record Section(5 copies), Publications Section (5 copies), the Deputy Registrar, Enrolment, Eligibility and Migration Section (3 copies), the Deputy Registrar, Statistical Unit (2 copies), the Deputy Registrar (Accounts Section),Vidyanagari (2 copies), the Deputy Registrar, Affiliation Section (2 copies), the Director, Institute of Distance Education,(10 copies) the Director University Computer Center (IDE Building), Vidyanagari, (2 copies) the Deputy Registrar (Special Cell), the Deputy Registrar,(PRO) . the Assistant Registrar, Academic Authorities Unit (2 copies)and the Assistant Registrar, Executive Authorities Unit (2 copies) . They are requested to treat this as action taken report on the concerned resolution adopted by the Academic Council referred to in the above Circular and that, no separate Action Taken Report will be sent in this connection. the Assistant Registrar Constituent Colleges Unit (2 copies), BUCT(1 copy), the Deputy Account, Unit V(1 copy), I/c-In-charge Director, Centralize Computing Facility (1 copy), the Receptionist the Telephone Operator (1 copy), the Secretary MUASA (1 copy), the Superintendent, Post-Graduate Section (2copies),the Superintendent, Th...

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Original

Enclosure to Item No. 4.29
15.4.2008

UNIVERSITY OF MUMBAI

Revised Syllabus

and Scheme of Examination
For
The Second Year
(Sem.III & IV)
of the

B.E. Degree Course

in Marine Engineering

(With effect from the academic year 2008-2009)

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UNIVERSITY OF MUMBAI
SCHEME OF EVALUATION

COURSE S.E. (MARINE ENGINEERING)
SEMESTER - III

Subject	No. of Periods per week (60 minutes each)			Duration of Theory papers (Hours)	Marks				
	Lecture	Practical	Tutorial		Theory	Term-work	Practical (2 Hrs.)	Oral	Total
*Applied Mathematics III	4	-	01	3	100	25	-	-	125
Strength of Materials I	4	2	--	3	100	25	-	-	125
Electronics & Computer Science	4	2	--	3	100	25			125
Marine Equipment Drawing i	1	3	--	4	100	25	-	-	125
Advance Workshop Practice	3	3	---	3 4 (PE)	100	25	25	25	175
Applied Thermodynamics I	3	-	---	3	100	-	-	-	100
Electrical Machines	4	2	--	3	100	25		-	125
Total	23	12	01		700	150	25	25	900

*Common with Automobile & Mechanical Engineering
P - Practical Exam

Each Term-Work Journal shall consist of Practical write-up/tutorial problems, assignment (if any) and test paper.

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UNIVERSITY OF MUMBAI
SCHEME OF EVALUATION

COURSE S.E. (MARINE ENGINEERING)
SEMESTER - IV

Subject	No. of Periods per week (60 minutes each)			Duration of Theory papers (Hours)	Marks				
	Lecture	Practical	Tutorial		Theory	Term-work	Practical (2 Hrs.)	Oral	Total
Applied Mathematics IV	4	--	--	3	100	--	-	-	100
Strength of Materials II	3	2	--	3	100	25	-	25	150
Applied Thermodynamics II	3	2	--	3	100	25	-	25	150
Naval Science	4	-	--	3	100	-	-	-	100
Marine Equipment Drawing-II	1	3	---	4	100	25	-	-	125
Marine Auxiliary Machines-I	4	2	--	3	100	25	-	-	125
Marine Boilers	3	2	-	3	100	25	-	25	150
TOTAL	22	11	--	--	700	125	-	75	900

For with Automobile & Mechanical Engineering

Term-Work Journal shall consist of Practical write-up/tutorial problems, assignment and test paper.

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CLASS: SE (Marine Engineering) | Semester-III

SUBJECT: APPLIED MATHEMATICS III

Periods per week 1Period of 60 min		
	Lecture	4
	Practical	--
	Tutorial	1

Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	--
	Term Work	--	25
	TOTAL		125

Sr. No.	Details	Hrs.
Module 01	**1. Complex Variables** 1.1 Functions of Complex variable 1.2 Continuity (only statement) and derivability 1.3 Analytic Function. Necessary conditions for the function to be analytic (statement of sufficient condition) 1.4 Cauchy Riemann equations in polar coordinates 1.5 Harmonic function and orthogonal trajectories 1.6 Milne-Thomson method to find analytic Function f(z)=u+iv for given u, v, u+v, u-v	11
Module 02	**2. Mapping** 2.1 Conformal mapping 2.2 Standard transformations and Bilinear transformation 2.3 Fixed points and cross ratio	04
Module 03	**3. Complex Integration** 3.1 Regions and Paths in the Z-plane 3.2 Line integral of a function of complex variable 3.3 Cauchy's integral theorem 3.4 Cauchy's integral formula and deduction (without proof) 3.5 Taylor's and Laurent's development (without proof) 3.6 Singularities, poles, residue at isolated singularity and its evaluation 3.7 Residue Theorem	13
Module 04	**4. Laplace's Transforms** 4.1 Function of bounded variation (statement only) 4.2 Laplace's transforms of 1, t^n, e^{at}, sin(at), cos (at), sinh (at), cosh (at) 4.3 Linearity property, expressions (without proof) for $L[e^{at} f(t)]$, $L[f(at)]$, $L[t^n f(t)]$, $L[f(t)/t]$, $L\left[\int_0^t f(u)\,du\right]$, $L\left[\frac{d^n}{dt^n} f(t)\right]$ 4.4 Periodic functions, Heaviside unit step function, Dirac- delta Function and their Laplace transforms (statement only)	09
Module 05	**5. Inverse Laplace Transforms** 5.1 Linearity property evaluation of inverse Laplace Transforms using theorems and by partial fraction method 5.2 Convolution Theorem (without proof) and Heaviside development 5.3 Application to solve initial and boundary valve problems involving ordinary differential equations with one dependent variable.	08
Module 06	**6. Matrices** 6.1 Types of Matrices. 6.2 Adjoint of a matrix, Inverse of a matrix, Orthogonal and Unitary matrices. 6.3 Elementary transformations, rank of a matrix.	15

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	6.4 Reduction to a normal form. 6.5 System of homogeneous and non homogeneous equations, their consistency and solution. 6.6 Brief revision of vectors over real field , Inner product, Norm, Linear dependence and independence, Orthogonality of matrix 6.7 Characteristic polynomial, values and vectors of square matrix 6.8 Characteristic polynomial, Cayley Hamilton Theorem (without proof) Functions of square matrix.	

Theory Examination:

1. Question paper will comprise of total seven question, each of 20 Marks
2. Question one will be compulsory and based on maximum part of syllabus.
3. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only five question need to be solved.

In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term Work:

The distribution of marks for term work shall be as follows:

- Tutorial work (One assignment on each module containing 05 problems): 10 Marks
- Test (at least one) ..... 10 Marks
- Attendance (Tutorial & theory): ..... 05 Marks

TOTAL: ..... 25 Marks.

References:

1) Matrices : Vasistha
2) A Text Book of Applied Mathematics : P. N. & J. N. Wartikar
3) Higher Engineering Mathematics : B. S. Grewal
4) Advance Engineering Mathematics : E. Kreyszig
5) Complex variables : R. V. Churchil
6) Laplace Tranforms . Schaum series

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CLASS SE (Marine Engg.)			Semester-III
SUBJECT: - Strength of Materials- I			
Periods per week 1Period of 60 min.	Lecture	4	
	Practical		
	Tutorial	2	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	-
	Term Work	-	25

Sr. No.	Details	Hrs.
Module 01	**1.1 Simple Stresses and Strains:-** Stress, Strain, Modulus of elasticity, modulus of Rigidity, bulk modulus, yield stress, ultimate stress, factor of safety, shear Stresses, Poisson ratio, bars of varying cross sections, composite sections, temperature stresses **1.2 Principal Stresses-:** General equations for transformation of stresses, principal planes and Principal Stresses, maximum stress, determination of principal stresses using Mohr's Circle, maximum principal stress and maximum Shear Stress theory of failure.	(10) (06)
Module 02	**2.1 Shear force and bending moment in beams:-** Shear force and bending moment diagrams for statically determinate beams, including beams with internal hinges for different types of loadings, relationship between rate of loading, shear force and bending moment.	(10)
Module 03	**3.1 Simple theory of bending:-** Flexural formula for straight beams, Moment of Inertia, Product of Inertia and Polar moment of Inertia of plane areas, principal axes of inertia, moments of inertia about principal axes, transfer theorem, simple problem involving application of flexural formula, section modulus, moment of resistance of a section, flexural stresses in beams of uniform strength. **3.2 Combined bending and direct stresses.: -** Application to members subjected to eccentric loads, core of a section, Applied problems	(08) (06)
Module 04	**4.1 Shear Stresses in Beams: -** Distribution of Shear Stress across plane section used commonly for structural purposes, shear connectors.	(06)
Module 05	**5.1 Torsion:-** Twisting of circular shafts – solid and hollow, stiffness and strength, power and torque relation, Shafts with liner and Compound Shafts, Partial hollow Shafts .Torsion applied to closed coil springs, springs with axial load calculations for mean diameter of springs, wire diameter and number of coils.	(08)
Module 06	**6.1 Thin Cylinders :-** Stresses and strains in thin cylinders and spheres due to internal pressure.	(06)

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List of Experiments:

1. Tension test on mild steel bar (stress-strain behavior, modulus determination)
2. Compression test on brick and concrete block
3. Brinell hardness test
4. Izod impact test / Charpy test

Theory Examination:

1. Question paper will comprise of total seven question, each of 20 Marks
2. Only five question need to be solved.
3. Question one will be compulsory and based on maximum part of syllabus.
4. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus

Term Work:

Term work shall consist of minimum 04 experiments/assignments and written test. The distribution of marks for term work shall be as follows:

- Laboratory work (experiments/assignments ..... 10. Marks.
- Test (at least one): ..... 10 Marks.
- Attendance (practical & theory): ..... 05 Marks.

TOTAL: ..... 25 Marks.

Text Books:

- Strength of Materials by S. Ramamrutham, Dhanpat Rai Publication
- Strength of Materials by R. K. Rajput, S.Chand Publication
- Strength of Materiasl by R. S. Khurmi, S Chand Publication
- Engineering Mechanics by Timoshenko & Young, Tata McGraw Hill

References:

- Mechanics of Materials, E.P. Popov, prentice Hall.
- Mechanics of Materials by James Gere-Thomson Learning.
- Mechanics of Structures S.B. Junnarkar, charotar publishers
- Mechanics of Materials by Ferdinand P Beer E, Russell Johnston, Jr John. T Dewolf McGrawhill International

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CLASS: SE (Marine Engg.)			
03-SUBJECT: - Electronics & Computer Science			Semester-III
Periods per week 1Period of 60 min	Lecture	4	
	Practical		
	Tutorial	2	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	-
	Term Work	-	25

Sr. No.	Details	Hrs.
Module 01	**1.1 Thyristors and Their Application: -** Principle of operation, characteristic, symbol, specification, Thyristor ratings, construction, two transistor analogy of SCR, DIAC and TRIAC characteristic, light dimmer control using DIAC / TRIAC circuits, UJT characteristic, UJT Triggering circuits, half controlled and full controlled rectifier using SCR.	(12)
Module 02	**2.1 Diodes, Transistors and Operational amplifier, Oscillators, Transistor power amplifier : -** Characteristics of Diode, Half , Full & Bridge rectifiers, Zener Diodes, Tunnel Diodes Clipping, Clamping ,Transistors configuration, Transistor as a switch, Effect of negative & positive feed back in transistor amplifier Regulated power suppliers. Series regulators, shunt regulator. Operational amplifier block diagram, ideal op-amp characteristics, inverting & non-inverting amplifiers. Conditions of Oscillations, phase shift oscillator, Wien Bridge Oscillator, Crystal Oscillators. Class A, B, C Power Amplifier, efficiency distribution Design Theory, Practical Complimentary Push-pull amplifier.	(15)
Module 03	**3.1 Inverters, Choppers, Dual Converters and Cycloconverters:** Inverters , Choppers, Dual Converters,Cycloconvertors Series and parallel invertors, different types of choppers, speed control of DC Motor and induction motor using chopper.	(10)
Module 04	**4.1 Solid State Control of d. c. and a. c. Motors:-** Introduction, Advantages of Electronic Control of Devices, D.C. Motor Speed Control, Speed Control of D. C. Shunt Motor using Thyristor Technology, Over-voltage & over current protection of D. C. Motors , An A.C. Motor Control.	(07)
Module 05	**5.1 Introduction to Microprocessors:-** Architecture of Intel 8085 Microprocessor, Instruction Set of 8085 Microprocessor and Simple Program Writing, Interfacing a Microprocessor with Memory and Input / Output Devices, Applications of Microprocessors	(08)
Module 06	**6.1 Operating Systems Concepts :-** Introduction to OS Introduction to processes, memory and file systems Examples of operating systems like LINUX,UNIX, WINDOWS	(08)

List of Experiments:

1. Diode rectifiers
2. Firing Characteristic of an SCR
3. Half-Wave Controlled Rectifier using SCR
4. Single-phase Half-controlled full-wave Rectifier using Two SCRs and Two Diodes
5. Illumination Control using TRIAC
6. UJT triggering circuit

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7. Speed Control of a D.C. Shunt Motor using SCR
8. Study of Introduction to OS
9. Case studies-Dos, UNIX, Windows, LINUX
10. Programming by using 8085 Microprocessor
11. Speed control of D.C. Motor using chopper circuits
12. Characteristics of power amplifiers.
13. Frequency response of common emitter amplifier using negative feedback.

Theory Examination:

1. Question paper will comprise of total seven question, each of 20 Marks
2. Only five question need to be solved.
3. Question one will be compulsory and based on maximum part of syllabus.
4. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term Work:

Term work shall consist of minimum 08 experiments, assignments and written test. The distribution of marks for term work shall be as follows:

- Laboratory work (experiments/assignments): .....10..... Marks.
- Test (at least one): .....10... Marks.
- Attendance (practical & theory): .....05..... Marks.

TOTAL: .....25.... Marks.

Text Books:

- Industrial Electronics & Control by S. K Bhattacharya / S. Chatterjee, Tata McGraw-Hill Publishing Company Limited.
- Electronic in Industry: Chute & Chute
- Thyristors & their application : Ramamurthy
- Operating Systems by D. M. Dhamdhere
- Operating Systems By Tannanbam

References:

- Industrial Electronics, by James Humphries, Leslie Sheets, 4e-Delmar Publications.
- Industrial Electronics by Biswanth Paul PHI
- Industrial Electronics for Technicians –by J. A. Sam Wilson Joseph Rissi, Prompt Publishing.
- Thyristorisd Power Control : Dubey
- Operating Systems by Godbole
- Operating Systems by Galvin

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CLASS: SE (Marine Engg.)			Semester-III
04-SUBJECT: - Marine Equipment Drawing-I			
Periods per week 1Period of 60 min.	Lecture	1	
	Practical	3	
	Tutorial	-	
		Hours	Marks
Evaluation System	Theory Examination	4	100
	Practical	-	-
	Oral Examination	-	-
	Term Work	-	25

Sr. No.	Details	TH Hrs.	PR Hrs.
Module 01	1.1 Solid Geometry Intersection of surfaces and interpretation of solids-Intersection of prism with prism and cylinder, intersection Cylinder with Cylinder. Intersection cone with prism and cylinder in simple position only	(03)	(09)
Module 02	2.1 Primary auxiliary views and aux. Projections of simple machine parts.	(03)	(09)
Module 03	3.1 Machine drawing Machine Elements Free hand sketches and preparation of working drawing of the following - bolts, nuts, washers, studs, tapped holes etc. Conventional representational of assembly of threaded parts in sectional views	(01)	(03)
Module 04	4.1 Detail and Assembly drawing: Introductions to unit assembly drawing steps involved in preparing assembly drawing from details and vice versa. Limits fits, and tolerance dimensioning with tolerances indicating various types of fit in detail and assembly drawing.	(02)	(06)
Module 05	5.1 Machinery Component Drawing: Drawing of complete machine components in assembly (Orthographic to Orthographic and isometric to Orthographic) with details like couplings, Glands, Return and non-return values, cocks & plugs, cylinder and piston assembly connecting rod with bearings.	(03)	(09)
Module 06	6.1 Marine Component Drawing: Assembly Drawing of simply marine components in Orthographic projection from Isometric views e.g. Bilge strainer Boxes, marine Diesel Pistons 2-stroke & 4-stroke types, Control Valves, Cylinder Relief Valve, Boiler Blow down valves, Diesel Engines Rocker arms.	(03)	(09)

List of Drawing sheets:-
1 Two Drawing sheets on intersection of solids.
2 One Drawing sheets on Auxiliary view.

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3 Detail and assembly drawing.

3.1 Universal joint / coupling
3.2 Old hams coupling
3.3 Non returr. valve
3.4 Stop valve
3.5 Blow off cock
3.6 Cylinder and piston assembly
3.7 Connecting rod with bearings.
3.8 Bilge strainer Boxes
3.9 Cylinder Relief Valve.
3.10 Boiler Blow down valves

Theory Examination:

1. Question paper will comprise of total seven questicn, each of 20 Marks
2. Only five question need to be solved.
3. Question one will be compulsory and based on maximum part of syllabus.
4. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term Work:

Term work shall consist of minimum seven Drawing sheets based on above syllabus and class test.
The distribution of marks for term work shall be as follows:

- Laboratory work (Drawing Sheets): ..... 10. Marks.
- Test (at least one) ..... 10 Marks.
- Attendance (practical & theory): ..... 05 Marks.

TOTAL: .....25 **Marks.**

Text Books:

- Machine Drawing By N. D. Bhatt
- Machine Drawing By Kamat & Rao
- Machine Drawing by Sidheshwar Shastri

References:

- Machine Drawing by M. B. Shah
- Engineering Drawing for Marine Engineers – Reeds Vol. II

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CLASS: SE (Marine Engg.)			Semester-III
05.SUBJECT: - Advanced Workshop Practices			
Periods per week 1Period of 60 min.	Lecture	3	
	Practical		
	Tutorial	3	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	4	25
	Oral Examination	-	25
	Term Work	-	25

Sr. No.	Details	Hrs.
Module 01	1.1 Classification of Manufacturing Process, Ferrous and non-ferrous metals and their alloys used in engineering their properties and uses. Metal surface treatment: Electroplating, galvanizing, anodizing, metal spraying.	(03)
Module 02	2.1 Lathes: Their construction and working operation of lathes screw cutting on C. lathe, attachments and accessories used on lathe, type of tools, cutting speed, feed, depth of cut and machining time, Tooling for simple jobs. . 2.2Drilling Machine : Types of machines types of drillings, operations such as drilling, boring reaming, tapping. Drill speeds and feeds	(05) (03)
Module 03	3.1 Planing Machine, shaping machine and slotting machine: Various types, construction and working of machine, operation, tolls, field of application. (Theory only). 3.2 Milling Machines: Types of machines, horizontal, vertical universal, Cutters and their application, operation on milling machines, Use of dividing head and circular table. Direct, Simple, compound differential and angular indexing and helical milling operation Table feed in milling, work-holding devices (Theory only). 3.3 Grinding: Grinding machines such as pedestal, cylindrical surface, centreless and tool and cutter grinder. Operation on the above mentioneded machines. Grinding wheel, Finishing operations. Such as lapping and honing. (Theory only).	(03) (05) (04)
Module 04	4.1 Welding and Joining Processes: Riveting, soldering and brazing. Fusion welding, gas and arc welding – submerged arc welding – inert gas welding – Electric slag welding – CO (2) welding – Thermit welding. Welding equipments. Pressure welding – solid phase welding- resistance welding – friction welding – other miscellaneous welding processes and equipments. Process capability and applications weld joints –types edge Preparations welding fixtures. Weldability – design, process and metallurgical consideration – testing and improvement of weldability – microstructure of weld welding defects.	(06)
Module 05	5.1 NC Technology Introduction, basic components of NC system, NC procedure, NC Coordinate systems, and NC motion control systems, Applications, Advantages and disadvantages of NC machines. 5.2 NC Part Programming Introduction, the punched tape in NC, Tape coding and format, Manual part programming. 5.3 Computer Aided NC Part Programming Introduction, Part programmers job, Functions of a post processor, NC part programming languages, Elements of APT language, The MACRO statement	(03) (02) (03)

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	in APT, NC programming with interactive graphics. 5.4 CNC Problems with conventional NC, CNC functions and advantages, DNC, Adaptive control, CNC programming concepts, Trends and new developments in NC including FMS.	(04)
Module 06	6.1 Fitting and Overhauling Types of packing and joining materials and their uses. Design consideration and construction of various types of valves and cocks. Reducing valves for stems and air Bedding of bearings, marking of engine parts for fitting machining operations, fitting of keys, cotters.	(04)

Practical Training on the following:

Air compressor overhaul
Reciprocating Pump overhaul
Centrifugal Pump overhaul
Gear Pump Overhaul
Welding: Double Vee weld steel plate 10mm
Welding: 'T' weld inner / outer
Pipe repair & fabrication

Theory Examination:

1. Question paper will comprise of total seven question, each of 20 Marks
2. Only five question need to be solved.
3. Question one will be compulsory and based on maximum part of syllabus.
4. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Practical and Oral Examination :

Practical and oral examination will be based on one experiment performed from the list of experiment given in the syllabus and the oral will based on the same experiment.

Term work:

Term work shall comprise of the class assignments, laboratory experiments and a class test based on above syllabus.

- Laboratory work (experiments/assignments): 10Marks
- Test (at least one): ..... 10Marks.
- Attendance (practical & theory): ..... 05Marks.

TOTAL: ..... 25Marks.

Text Books:

- Workshop Technology by W. A. J. Chapman Part I, II & III
- Elements of Workshop Technology by Hazra Choudhary Vol. I, II & III
- CAD/CAM/CIM by P. Radhakrishnan.

References:

- A Textbook of Foundary Technology by M. Lal
- Production Tecfhnology by R. C. Patel and C. G. Gupta Vol. I & II
- Manufacturing processes & Materials for Engineers by Doyle
- Production Technology By HMT
- Production Technology by Jain & Gupta
- Manufacturing Process by Roy A. LINDBERG
- CAD/ CAM by Ibrahim Zeid. CAD/CAM/CIM by P. Radhakrishnan

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CLASS: SE (Marine Engg.)		Semester-III	
OF SUBJECT: - Applied Thermodynamics -i			
Periods per week 1Period of 60 min.	Lecture	3	
	Practical	-	
	Tutorial	-	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	-
	Term Work	-	-

Sr. No.	Details	Hrs.
Module 01	**1.1 Revision of Thermodynamic concepts:** System, surrounding, state, path, property. Reversible and irreversible process, thermodynamic work, heat. Temperature, thermal equilibrium. Zeroth law of thermodynamics.	(04)
Module 02	**2.1 First Law of Thermodynamics:** Joule's experiment to verify first law. First law applied to non-cyclic process. Internal energy is a property. Joule's experiment of internal energy. Equation of state of ideal gas. Universal and specific gas constant. Application of first law to non flow processes viz. constant volume, constant pressure, constant temperature, adiabatic and polytropic processes. Heat and work calculations. Application of first law to open systems. Steady flow energy equation. Throttling process. Joule's porous plug experiment. Joule Thomson coefficient. Calculation of work done in steady flow processes	(07)
Module 03	**3.1 Second Law of Thermodynamics:-** Limitations of first law of thermodynamics. Heat engine thermal efficiency, reversed heat engine, coefficient of performance. Carnot cycle. Kelvin-Planck and Claussius statements and their equivalence. Perpetual motion machines of first and second kind, Carnot theorem. Thermodynamics temperature scale.	(07)
Module 04	**4.1 Availability:** Available and unavailable energy. Available energy when heat is withdrawn from an infinite reservoir and when heat is withdrawn from a finite reservoir. Availability of closed systems and steady flow system. Irreversibility.	(06)
Module 05	**5.1 Properties of Gases:** Characteristic Equation of State for a Perfect Gas; Equation of State for Real Gas; Internal Energy of a Gas and joule's Law. Two Specific Heats of a Gas and relation between them. Different Gas Processes an Heat & Work Transfer in Various Gas Processes; Concept of Entropy; Change of Entropy in different, Gas processes; Temperature Entropy Diagram; Applied Problems.	(07)
Module 06	**6.1 Properties of Steam:** Wet, dry saturated, superheated steam. Enthalpy, internal energy and entropy of steam. First law of thermodynamics applied of steam processes. i.e. constant volume, constant pressure, hyperbolic, isentropic and polytropic processes. Temperature-entropy and enthalpy-entropy diagrams of steam. Methods of determining the dryness fraction. Separating and throttling calorimeter. **6.2 Boilers:** Different types of boilers, Boiler calculations; Boiler Thermal Efficiency and Equivalent Evaporation of a boiler; Applied Problems.	(08) (06)

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Theory Examination:

1. Question paper will comprise of total seven question, each of 20 Marks
2. Only five question need to be solved.
3. Question one will be compulsory and based on maximum part of syllabus.
4. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Text Books:

- Thermal Engineering R. K. Rajput-by Laxmi Publications
- Thermal Engineering By Kothandraman, Domkundwar, Khajuria, Arora-Dhanpatrai & Sons.
- Thermodynamics By P. K. Nag- Tata McGraw Hill Co. Reprint 1992

References:

- Thermodynamics By W.C. Reynolds, McGraw- Hill, New York, 1969
- Thermodynamics By J. P. Holeman, McGraw-Hill 1974
- Engineering Thermodynamics By M. S. Saad, McGraw- Hill1976
- Thermal Engineering – Ballaney- Khanna Publishers
- Thermodynamics an Engineering Approach- Yonus Cengal Tata McGraw Hill

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CLASS: SE (Marine Engg.)			Semester-III
01-SUBJECT: - Electrical Machines			
Periods per week 1Period of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	-	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	-
	Term Work	-	25

Sr. No.	Details	Hrs.
Module 01	**1.1 Direct current Machines(Generators and Motors) –** Principle of working of generator, construction, winding, e. m. f. equation, losses, power stages, armature reaction, commutation, methods to improve commutation ,brush shift, compensating winding interpoles D. C. generator, their characteristic, methods of excitation, parallel operation, equalizer busbar, performance equations etc. D. C. Motor principle, Types, their characteristics, speed-torque equations, starters, speed control, testing of D.C. Machines, applications, power stages, braking of D. C. Motor.	(15)
Module 02	**2.1 Transformers-** Principle of action, e. m. f. equation, phasor diagrams under no load and load conditions, leakage reactance, equivalent circuits, voltage regulation, losses and efficiency, open circuit and short circuit tests, parallel operations, three phase transformer-core and shell type current and potential transformer, auto-transformers (single phase & 3-phases).	(10)
Module 03	**3.1 Three Phase Induction Motor-** Principle of operation, slip speed, rotor to stator relationship, rotor frequency, rotor e. m. f. and current, equivalent circuit relationship between rotor copper loss and the rotor slip, torque/slip characteristics, power stages starting torque and maximum running torque, reversing, speed control of induction motor, starting of induction motor, method of starting D.O.L, Star/Delta, Auto. single phase induction motor-principle and operational characteristics, constructional details. Failure & repairs of electrical machines.	(10)
Module 04	**4.1 Alternators and Synchronous Motor:-** General arrangement of alternators, construction of sailent pole and cylindrical-rotor types, types of stator windings, e. m. f. equation of an alternator, distribution and pitch factor, waveform of generated e .m. f, phasor diagrams, load characteristics & regulation, parallel operation of alternators, KW & KVA sharing. Synchronous motor principle, method of starting, torque/angle characteristics & hunting, motor on load with constant excitation, effect of change in excitation, V curve, comparison between induction motor and Synchronous motor, in Methods of starting, merits & limits of synchronous motor over others.	(14)
Module 05	**5.1 D. C. and A. C. Transmission and Distribution-** Two wire and three wire D. C. System, use of balancer, A. C. Transmission single phase and three phase, three wire and four wire distribution, comparison of D. C. and A. C. transmission, effect of voltage drop, copper utilization under different systems, single and double fed distributors, fuses, D. C. air circuit breaker, A. C. air and oil circuit breakers.	(07)
Module 06	**6.1 Safe Working Practices:-** Safe working practices to be followed while using and during Maintenance and Repairs of electrical and electronic equipments. Statutory requirements in respect of installation, working & use of electrical equipments.	(04)

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List of Experiments:

1. Safe working practices of be followed while using & maintaining electrical machinery.
2. Study of dismantled parts of DC Machine
3. Study of Three Point Starter
4. Speed control of DC Shunt motors using field and armature control method.
5. Open circuit and short circuit test on single phase transformer
6. Load test on single phase transformer
7. Load test on three phase induction motor
8. To study characteristics of single phase capacitor start induction motor.
9. Parallel operation of transformers
10. Synchronization of three phase alternators.
11. To study the slip-torque characteristics of three phase induction motor.
12. To determine the regulation of a 3-phase alternator by synchronous impedance method.
13. Determine of phase-sequence of the given-3-phase supply.

Theory Examination:

1. Question paper will comprise of total seven question, each of 20 Marks
2. Only five question need to be solved.
3. Question one will be compulsory and based on maximum part of syllabus.
4. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus

Term Work:

Term work shall consist of minimum ...08..... experiments, assignments and written test. The distribution of marks for term work shall be as follows:

- Laboratory work (experiments/assignments) ..10..... Marks.
- Test (at least one): ..... 10 Marks.
- Attendance (practical & theory) ..... 05 ...Marks.

TOTAL: ....25..... Marks.

Text Books:

- A text book of electrical technology by B. L. Theraja & A. K. Theraja Vol- II
- Marine Electrical Practice by G. O. Waston
- Higher Electrical Engineering by J. Shepherd A. H. Morton L. F. Spence.
- Practical Marine Electrical Knowledge by D T Hall

References:

- Electrical Machines by Bimbra
- Power Systems by Soni Gupta & B' atnagar
- Electrical Machines by Shanker Sen, Khanna Publications
- Power Systems Uppal

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CLASS: SE (Marine Engineering)			Semester- IV
SUBJECT: APPLIED MATHEMATICS - IV			
Periods per week 1Period of 60 min.	Lecture	4	
	Practical	--	
	Tutorial	1	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	--	--
	Oral Examination	--	--
	Term Work	--	--
	TOTAL	--	100

Sr. No.	Details	Hrs.
Module 01	**1.Fourier Series** 1.1 Orthogonal and orthonormal functions. Expression for a function in a series of Orthogonal functions 1.2 sine and cosine functions and their Orthogonality properties 1.3 Fourier Series of periodic functions with period 2π and $2L$. Dirichlets theorem (only statement) 1.4 Even and odd functions 1.5 Half range sine and cosine series 1.6 Parsevalls relations (only statement) 1.7 Complex form of Fourier series 1.8 Fourier integrals with even and odd functions.	16
Module 02	**2.Partial Differential Equations** 2.1 Partial differential equation governing transverse vibrations of an elastic string, its formulation and solution using Fourier series. 2.2 Heat equation, steady- state configuration for heat flow. 2.3 Two & Three dimensional Laplace equation.	14
Module 03	**3. Random Variables:** 3.1 Discrete and continuous random variables, probability mass function and density function. Probability distribution for random variables Expected value, Variance.	04
Module 04	**4. Probability distributions:** 4.1 Binomial, Poisson and Normal Distributions.	10
Module 05	**5. Sampling theory:** 5.1 Sampling distribution. Test of Hypothesis. Level of significance, critical region. One tailed and two tailed tests. Interval Estimation of population parameters. Large and small samples. 5.2 Test of significance for Large samples: Test for significance of the difference between sample mean and population means, Test for significance of the difference between the means of two samples. 5.3 Student's t-distribution and its properties. Test of significance of small samples: Test for significance of the difference between sample mean and population means, Test for significance of the difference between the means of two Samples, Chi-square distribution and its properties, Test of the Goodness of fit.	09
Module 06	**6. Fitting of curves:** 6.1 Least square method: Fitting the straight line and parabolic curve. Bivariate Frequency Distributions, Correlation. Co-variance, Karl Pearson Coefficient &	07

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Spearman's Rank Co-relation Coefficient (non-repeated & repeated ranks, without proof) Regression Coefficient & lines of regression.

Theory Examination:

1. Question paper will comprise of total seven question, each of 20 Marks
2. Question one will be compulsory and based on maximum part of syllabus
3. Remaining questions will be mixed in nature (for example supposed Q 2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4. Only five question need to be solved.
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Reference Books:

1) A Text Book of Applied Mathematics : P. N. & J. N. Wartikar
2) Mathematical Statistics : J. N. Kapoor & H. C. Saxena
3) Higher Engineering Mathematics : Dr. B. S. Grewal
4) Probability, Statistics and Random Processes : T. Veerarajan
5) Advance Engineering Mathematics : E. Kreyszig

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CLASS: SE (Marine Engg.)

BE-SUBJECT: - -Strength of Materials-II

Periods per week 1Period of 60 min.	Lecture		Semester-IV
	Practical		3
	Tutorial		2
Evaluation System	Theory Examination	Hours	Marks
	Practical	3	100
	Oral Examination	-	-
	Term Work	-	25
		-	25

Sr. No.	Details	Hrs.
Module 01	**1.1 Deflection of Beams:-** Deflection of cantilevers, simply supported and overhanging beams using double integration and Macaulay's method for different types of loading, moment area methods of deflection coefficients, deflection by graphical method, Catigliano's theorem and its application for computing deflections in beams.	(09)
Module 02	**2.1 Fixed and continuous beams:-** Moment area method, built-in beam with central concentrated load, built-in beam with uniformly distributed load, with load not at center, Macaulay's method continuous beam, Claperyron's three moment theorem. Applied problems	(07)
Module 03	**3.1 Bending of Curved bars:-** Flexural stresses in beams with initial curvature. Application to crane hooks, chain links and rings, Castigliano's theorem and its application to curved bars. Applied Problems.	(07)
Module 04	**4.1 Thick Cylinders:-** Thick Cylinders, Lame's theory, compound cylinders, solid shaft subjected to radial pressure, shrinkage allowance. Applied Problems.	(06)
Module 05	**5.1 Struts:-** Euler's theory and Euler's buckling load, struts with both ends pin joined, both ends fixed, one end fixed and one end free, one end hinged, Pin joined strut with eccentric load, Rankine- Gorden Formulae. Applied problems.	(07)
Module 06	**6.1 Strain energy:-** Strain energy due to axial force and bending moment stresses in axial members and simple beam due to impact loading, strain rosette and its use on ship's hull, Strain energy due to twisting, strain energy due to impact loads, Resilience. Applied problems. **6.2 Springs:-** Open Coiled helical spring, spiral and leaf spring with Applied Problems.	(09)

List of Experiments:

1. Flexural Test on Beam (Central Point Load)
2. Flexural Test on Beam (Two Point Load)
3. Plotting of Load Deflection curves & finding value of E for above experiments (1&2).
4. Repeating experiments above with I, T & H section beams.

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5 Non Destructive Tests, magnetic particle tests, Ultrasonic and Radiographic Texts to read & write and essay and explain.

Theory Examination:

1 Question paper will comprise of total seven question, each of 20 Marks
2 Only five question need to be solved.
3 Question one will be compulsory and based on maximum part of syllabus.
4 Remaining questions will be mixed in nature (for example supposed Q 2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5 In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Oral Examination:

Oral examination will be based on above syllabus.

Term Work:

Term work shall consist of minimum 05 experiments, assignments and written test. The distribution of marks for term work shall be as follows:

- Laboratory work (experiments/assignments): .....10.. Marks.
- Test (at least one): .....10 Marks.
- Attendance (practical & theory): .....05 Marks.

TOTAL: .....25 Marks.

Text Books:

- Strength of Materials by S. Ramamrutham, Dhanpat Rai Publication
- Strength of Materials by R. K. Rajput, S .Chand Publication
- Strength of Materials by R. S. Khurmi, S. Chand Publication
- Engineering Mechanics by Timoshenko & Young, Tata McGraw Hill

References:

- Strength of Materials : Arthur Morely
- Mechanics of Materials, E.P. Popov prentice Hall.
- Mechanics of Structures S. B. Junnarkar, Charotar publishers
- Mechanics of Materials by Ferdinand P Beer E. Russell Johnston, Jr. John T. Dewolf McGraw hill International

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CLASS: SE (Marine Engg.)			Semester-IV
03.SUBJECT: - Applied Thermodynamics-II			
Periods per week 1Period of 60 min.	Lecture	3	
	Practical	2	
	Tutorial	-	
Evaluation System:		Hours	Marks
	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	25
	Term Work	-	25

Sr. No.	Details	Hrs.
Module 01	**1.1Ideal Gas Cycles:** Otto. Diesel, Dual Cycles, Brayton Ericsson, Stirling cycle. Air standard efficiency and mean effective pressure. Representation on P-V and T-S diagrams. Comparison of various cycles. 4 stroke & 2 stroke Cycle; Compression Ratio and thermal Efficiency, Indictor Diagrams, Indicated Power; Brake Power; friction Power, Mechanical Efficiency; Specific Fuel consumption; Energy Balance; Applied Problems.	(10)
Module 02	**2.1 Steam Power Cycles:-** Carnot cycle for steam and ideal Efficieny, Rankine cycle with dry saturated steam and superheated steam. Feed Pump work. Role of Boiler, Condenser and ejector in steam cycle; Rankine Efficiency, cycle Efficiency, Isentropic Efficiency, work Ratio, Reheating and Regenerative Feed Heating and their effect on Thermal Efficiency. Applied Problems.	(08)
Module 03	**3.1 Gas Turbines:-** Constant Pressure Combustion Turbines. Constant Volume Combustion Turbines, Applied Problems.	(07)
Module 04	**4.1 Reciprocating Compressors:-** Ideal cycle for compressors, work Transfer in single stage compressor, Mass and volume flow, free Air Delivery, Effect of clearance and volumetric Efficiency in Single stage compressors, Multi-stage compression neglecting clearance and with clearance. Condition for Minimum work Input and Perfect Intercooling Tandem and In-line arrangement in compressors. Applied Problems, Air motors, Introduction to rotary compressors.	(10)
Module 05	**5.1 Properties of Mixtures of gases and Gas & Vapours:-** Dalton's Law of partial pressure, Amagat's Law of partial volume. Volumetric and Gravimetric Analysis of Gas Mixtures, Gibb's-Dalton Law, Mean value of a Gas constant. Equivalent Molecular weight, Density, Specific volume, Specific Heat and Molar Heat capacity of gas mixture. Advanced problems on Adiabatic Mixing.	(08)
Module 06	**6.1 Psychrometry :-** Air and Water vapour mixture, Specific Humidity, Relative Humidity, Dew point, unsaturated and saturated air. Psychrometry Processors.	(02)

List of Experiments:

1. Study of boilers.
2. Study of boilers mountings.
3. Study of boilers accessories.
4. Study or experiment on heat balance sheet of Four Stroke Engine.
5. Study or experiment on gas turbine.
6. Study or experiment on mass flow rate of air through orifice plate or nozzle.

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7. Trial on air compressors.
8. Study of Rotary Compressors.
9. Study or experiment on calorific value at constant pressure and constant volume.

Theory Examination:

6. Question paper will comprise of total seven question, each of 20 Marks
7. Only five question need to be solved.
8. Question one will be compulsory and based on maximum part of syllabus.
9. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
10. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Oral Examination:

Oral examination will be based on above syllabus.

Term Work:

Term work shall consist of minimum 07 experiments, assignments and written test. The distribution of marks for term work shall be as follows:

- Laboratory work (experiments/assignments): .....10..... Marks.
- Test (at least one): .....10... Marks.
- Attendance (practical & theory): .....05.. Marks.

TOTAL: .....25.... **Marks.**

Text Books:

- Thermal Engineering – R. K. Rajput, Laxmi Publications.
- Thermal Engineering By Kothandraman, Domkundwar, Khajuria, Arora-Dhanpatrai & Sons

References:

- Steam and gas turbine- R. Yadav
- Thermodynamics and Heat Engines Vol II By R. Yadav, Central Publishing House, Reprint 1994
- Thermal Engineering by Ballancy, Khanna Publishers
- Thermodynamics an Engineering Approach- Yonus Cengal Tata McGraw Hill

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CLASS :SE (Marine Engg.)			Semester-IV
SUBJECT : -Material Science			
Periods per week 1Period of 60	Lecture	4	
	Practical	-	
	Tutorial	-	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	-
	Term Work	-	-

Sr. No	Details	Hrs.
Module 01	**1.1Solid Crystalline Structure:-** Crystallization of liquid into solid state. Nucleation and growth in metals and alloys.Formation of polycrystalline and single crystals. Classification of crystal structure. FCC, BCC and HCP lattice. Lattice structure, unit cell, crystallographic notation-Methods for planes and directions.	(05)
Module 02	**2.1 Strain Hardening:-** Definition and importance of strain hardening. Dislocation theory of strain hardening. Effects of strain hardening on engineering behavior of materials. Recrystallization. Annealing. Theory and stages of recovery. Recrystallization and grain growth. Factors affecting recrystallization temperature. Hot and cold working theory. Their advantages, limitations and applications. **2.2 Strengthening Mechanisms:-** Theory and applications of Strain hardening, Age hardening, Precipitation hardening and Dispersion hardening	(09)
Module 03	**3.1 Fracture:** Definition and types of fracture. Brittle fracture. Griffith's theory of fracture. Growan's modification Dislocation theory of fracture. Critical stress and crack propagation velocity for brittle fracture. Ductile fracture Notch effect on fracture. Fracture toughness. Ductility transition. Definition and significance. Conditions of ductility transition & factors affecting it.	(05)
Module 04	**4.1 Fatigue Failure:** Definition of fatigue and significance of cyclic stress. Mechanism of fatigue and theories of fatigue failure. Fatigue testing. Test data presentation and statistical evaluation. S. N. Curve and its interpretation. Influence of important factors on fatigue. Notch effect, surface effect. Effect of prestressing, corrosion fatigue. Thermal fatigue. **4.2 Creep:** Effect of temperature on mechanical behavior of materials. Definition and signification of creep. Creep testing and data presentation Mechanisms and types of creep. Analysis of classical creep curve. Creep Resistant materials.	(10)
Module 05	**5.1 Theory of Alloys & Alloy Diagrams:** Significance of alloying, definition, classification and properties of different types of alloys.	(17)

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	Different types of alloy diagrams and their analysis. Solid solutions. Conditions of their formation and significance, solid solution strengthening. Importance of Iron as engineering material, Allotropic forms of Iron. Influence of carbon in Iron-Carbon alloying. Iron carbide diagram and its analysis. Classification of Steels and Cast Irons: **5.2 Graphitisation of Iron:** Grey Iron, White iron, Mechnite iron, Alloy cast irons, Nodular & Malleable irons. Their microstructures and applications. **5.3 Effect Alloying Elements in Steels:-** Limitation of plain carbon steels. Significance of alloying elements. Effects of major and minor constituents. Effect of alloying elements on ferrite, carbide, austenite. Effect of alloying elements on phase transformation, decomposition, hardening and tempering. Classification of tool steels and metallurgy of tool steels and special steels. Alloy Steels: Effects of alloying elements on the structures, properties and applications of steels. Such as Manganese, Nickel, Chromium, Tungsten, Molybdenum and Silicon Steels.	
Module 06	**6.1 Theory of Heat Treatment:** Definition and Significances of heat treatment. Equilibrium and nonequilbrium transformation of Austenite. Time Temperature Transformation (TTT) diagram. Isothermal Austenite decomposition. Mechanisms of Pearlite Bainite and Martensite transformations. **6.2 Heat Treatment Process:** Technology of heat treatment. Classification of heat treatment process. Annealing- Principle process, properties and applications of Full annealing, Diffusion annealing, process annealing and Cyclic annealing. Annealing defects and their remedies. Normalizing, hardening, heat treatment, hardening baths, hardening media, Salt baths. Hardenability. Tempering, subzero treatment, Austempering Martempering, Maraging and Ausforming processes. **6.3 Surface Hardening:-** Hardening and surface hardening methods. Their significance and applications. Carbursing, Nitriding, Cyaniding, Carbonitriding, induction hardening and Flame hardening processes.	(14)

Theory Examination:

11 Question paper will comprise of total seven question, each of 20 Marks
12 Only five question need to be solved.
13 Question one will be compulsory and based on maximum part of syllabus.
14 Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
15 In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Text Books:

- Material Science by Dr. Kodgire.
- Physical Metallurgy by Avner.
- Engineering Metallurgy Part I & II – R. A. Higgins. ELBS & Hodder Stoughton, London.
- Engineering Physical Metallurgy, By Y, Lakhtin, Mir Publishers, Moscow.
- Introduction to Engineering Materials, By B. K. Agrawal, Tata McGraw Hill Publishing Co. Ltd.

References:

- Mechanical Metallurgy: G. E. Dieter, McGraw Hill International New Delhi.
- The Structure and properties of Materials Vol1: Structure- M. G. Moffet, GT. W. Pearsall & J. Wulff.

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CLASS: SE (Marine Engg.)

SUBJECT: - Marine Equipment Drawing II — Semester-IV

Periods per week 1Period of 60 min	Lecture	1	
	Practical	3	
	Tutorial	-	
Evaluation System	Theory Examination	Hours	Marks
	Practical	4	100
	Oral Examination	-	-
	Term Work	-	-
		-	25

Sr. No.	Details	Hrs. TH	Hrs. PR
Module 01	1.1 Auxiliary Machine:- 1.1.1 Flow regulator 1.2 Hydraulic steering gear 1.3 Quick closing valve	03	11
Module 02	2.1 Marine Boiler:- 2.1.1 Full bore safety valve 1.2 High lift safety valve	03	10
Module 03	3.1 Marine Boiler Mounting:- 3.1.1 Plate type gauge glass	02	05
Module 04	4.1 Marine Diesel Engine.- 4.1.1 Four Stroke piston and rod 1.2 Air inlet valve 1.3 Fuel valve.	04	12
Module 05	5.1 Marine Steam Engine:- 5.1.1 Turbine flexible coupling	01	03
Module 06	6.1 Propulsion Drive:- 6.1.1 Stern tube and tail shaft.	02	04

List of Experiments: -

Othographic Working drawing of the following

1. Flow regulator
2. Hydraulic steering gear
3. Quick closing valve
4. Full bore safety valve
5. High lift safety valve
6. Plate type gauge glass
7. 4- Stroke piston & rod
8. Air inlet valve
9. Fuel valve
10. Turbine flexible coupling
11. Stem tube & tail shaft

Theory Examination:

16. Question paper will comprise of total seven question, each of 20 Marks
17. Only five question need to be solved.
18. Question one will be compulsory and based on maximum part of syllabus.

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19. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
20. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term Work:

Term work shall consist of minimum 08 Drawing sheets from above syllabus and written test. The distribution of marks for term work shall be as follows:

- Laboratory work (experiments/assignments): .....10..... Marks.
- Test (at least one): .....10... Marks.
- Attendance (practical & theory): .....05..... Marks.
- TOTAL: .....25.... Marks.

Text Books:

- Engineering Drawing for Marine Engineers Reeds Vol 11
- Engineering Drawing N D Bhatt
- Engineering Drawing Kamath & Rao

References:

- Engineering Drawing Kannaih & Narayana
- Engineering Drawing Dr. M B Shah & B C Rana
- Machine Drawing N D Bhatt
- Drawing for Marine Engineers Mc Gilbons.

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CLASS: SE (Marine Engg.)			Semester-IV
06-SUBJECT: - Marine Auxiliary Machinery I			
Periods per week 1Period of 60 min.	Lecture	4	
	Practical	2	
	Tutorial	-	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	-
	Term Work	-	25

Sr. No.	Details	Hrs.
Module 01	**1.1 Engine Room Layout, pipe line systems with filters and associated fittings** Layout of main and auxiliary machinery in engine rooms of different ships. Layout of pipe with fittings, pipe material. Piping arrangement for steam, bilge, ballast, fire, HFO, DFO, LO, seawater, fresh water, compressed air and hydophore systems. Bunkering procedures including safety fittings. Construction, operation, and maintenance of various filters, stainers, auto cleaners. Arrangement of different types of tanks of E.R. **1.2 Pumps, pumping and control arrangements** Types of pumps for various requirements, their characteristics and applications in ships. Construction and operation of centrifugal pumps, gear pumps, screw pumps and reciprocating pumps and control arrangements for each type, care and maintenance of pumps.	(06) (05)
Module 02	**2.1 Blowers and compressors** Constructional details and operational procedures of blowers and compressors. Engine room force draft and exhaust system. Air bottles, constructions, mountings and associated systems. **2.2 Deck Machinery** Various types of deck machinery used in ships, eg., winches and windlass and their construction requirements, operation and maintenance. Deck cranes, hydraulic deck machinery, hydraulic motors, line filters and systems	(06) (05)
Module 03	**3.1 Evaporators** Construction and operation of different types of vacuum evaporators Fresh water generators and distillers. Conditioning arrangements of distilled wate for drinking purpose, membrane system **3.2 Heat Exchangers** Construction, operation and maintenance of all types of tubular and plate type heaters and coolers for FO & LO and water Corrosion combat arrangements. Tube removal, plugging and materials used.	(05) (06)
Module 04	**4.1 FO & LO treatment (Purification) arrangements :-** Theory of oil purification, separation and clarification. Various methods of oil treatment, i.e., purification, filtration, separation by gravity, homosiriser. Construction, operation & maintenance of centrifuges for heavy fuel and lubricating oil, automatic desludgers. Treatment of HO of very high density. **4.2 Fuels:-** Source of supply, study of primary fuels, coal, petroleum, natural gases. Classification of fuels. Treatment of fuels for combustion in marine ICE and steam plants, residual fuels, emulsified fuels, merits and demerits of such fuel in marine engines. Heating process of residual fuel to get correct viscosity at IC engine and boiler. **4.3 Lubrication** Theories of lubrication, types of lubricants and their properties. Suitability of lubricants for various uses, solid and fluid lubricants. Additive oils and their	(05) (07) (05)

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	specific use. Terminology used in lubrication system. Loading pattern of various bearings in marine use and lubrication system adopted. Different types of bearing used for marine machineries. LO analysis and monitoring of engine through report.	
Module 05	**5.1 Poilution prevention and control arrangements, equipments** Construction, operation & maintenance of conlescers, baffles, grids. Stokes law. Static and Turbulo separators, 15 ppm oily bilge separators and its measuring instruments. Control of leakage of oil in engine room and its disposing through shore connection. MARPOL Convention discharge criteria of quantity of oil from engine room. Cargo pumping arrangement of oil and chemical tankers, garbage treatment.	(06)
Module 06	**6.1 Communication system** Sound power internal telephone, telegraph, voice pipe, ER emergency alarm and other alarm systems.	(04)

Practical Training (Assignments) on the following:-

1 Pipe line tracing and making sketches for steam, bilge, ballast, fire, HFO, DFO, LO, Seawater, freshwater, compressed air and hydrophore systems.
2 Inspection of a starting Air bottle, sketch with labeling. Overhauling of Air bottle mountings. Sketch with labeling of a two stage Air Compressor.
3 Study of a Fresh Water Generator, Sketch with labeling. A write-up on operation.
4 Study of a 15 ppm. Oily bilge Separator, Sketch with labeling. A write-up on operation.
5 Overhauling of a typical cooler. Preparation of a working sketch. A write-up on maintenance and cleaning.
6 Study of all parts of a Purifier. Sketch and labeling. A write-up on working principle and routine cleaning and maintenance.
7 Sketch and labeling of reciprocating centrifugal, gear and screw pumps. A write-up on routine overhaul, routine maintenance and replacement of components.
8 Study of a windlass typically used on ships. sketch and label.
9 Study of FO treatment from service tank to fuel injector. Sketch and label.
10 An essay on LO analysis and monitoring of lubrication system of a large two stroke heavy oil Engine used for main propulsion.
11 An essay on Communication system need in a modern ER.

Theory Examination:

1 Question paper will comprise of total seven question each of 20 Marks
2 Only five question need to be solved.
3 Question one will be compulsory and based on maximum part of syllabus.
4 Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5 In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Term Work:

Term work shall consist of minimum 06 assignments and written test. The distribution of marks for term work shall be as follows:

- Laboratory work (experiments/assignments): ..... 10 ..... Marks
- Test (at least one): ..... 10 Marks
- Attendance (practical & theory): ..... 05 Marks

TOTAL: ..... 25. Marks.

Text Books:

1 Marine Aux Machinery, D.W. Smith (Newnes – Butterworth)
2 General Engineering Knowledge, H.D. McGeorge, Butterworth Heinman
3 General Eng. Knowledge for Marine Engineers, Reeds Practical Mathematics Series Vol 8

References:

1 Marine Engg. Practice Booklets - Inst. Of Marine Engineers Publications, Volume 1 to 19
2 Introduction to Marine Engg., D.A. Taylor, Butterworth - Heineman
3 Notes on Instrumentation & Control, G. J. Roy, Stanford Maritime, London
4 Ship Design & Construction, Society of Naval Architects & Marine Engrs (SNAME), N.Y.N.Y. 10048

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CLASS: SE (Marine Engg.)			Semester-IV
07-SUBJECT: - Marine Boilers			
Periods per week 1Period of 60 min.	Lecture	3	
	Practical	2	
	Tutorial	-	
Evaluation System		Hours	Marks
	Theory Examination	3	100
	Practical	-	-
	Oral Examination	-	25
	Term Work	-	25

Sr. No.	Details	Hrs.
Module 01	1.1 General Considerations governing the design of boilers - Types of Marine boilers, comparison of smoke tube and water tube boilers. Destructive and non-destructive tests on plates, rivets, welded seams. Classification societies requirements for boilers construction.	(05)
Module 02	2.1 Smoke Tube Boilers Various types in marine use. Principal dimensions and staying of flat surface of multitubular cylindrical Boilers. Fired vertical Auxiliary Boilers, Cochran vertical boiler.	(05)
Module 03	3.1 Water Tube Boilers General description with sketches of principal types of boilers in marine use, Double Evaporation Boiler, Superheater, Economiser, Air pre-heater, circulation and use of unheated Down comers in highly rated boilers, superheat temperature control, Attemperators and De-superheaters.	(10)
Module 04	4.1 Waste heat smoke / water tube boilers and economizers Waste heat recovery calculation. Lamont Exhaust gas boiler, forced water circulation boiler. Composite boiler of various make including W.T. boiler driving turbo-generator in motor ships.	(05)
Module 05	5.1 Boiler mountings Safety valves- Improved High Lift, Full Lift and Full Bore type. Gauge Glass – plate type and remote indicator. Automatic feed regulator, three-element control, high and low water level alarms. Main stop valves. Blow down and scum blow down arrangements. Manhole and hand-hole covers. Soot blowers for Air heaters and superheaters including retractable type.	(06)
Module 06	6.1 Operation, care and maintenance Precommissioning procedures. Hydraulic tests, steam raising and operating procedures. Action in the event of shortage of water. Blowing down of boiler, laying up a boiler, general maintenance. External and internal tube cleaning. Tube plugging and subsequent renewal Inspection and survey of boilers. Boiler water treatment for feed water,condensate and Boiler, tests, doses, blow down, de-aeration, by mechanical and chemical means. PH and Phosphate contents for modern high pressure boiler.	(07)
	6.2 Refractory Purposes of refractory, types of refractory, reasons for failure, and maintenance, Use of Membrane Water- wall Tubes	(02)
	6.3Oil Burning Procedure of liquid fuel burning in open furnace Various types of atomizer. Air Register Furnace arrangement for oil burning Boiler control system, i.e., master control, fuel control, air control and viscosity control	(05)

Practical Training (Assignments) on the following:-

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1. Inspection of a water tube boiler. Preparation of a sketch and labeling.
2. Inspection of a smoke tube boiler. Preparation of a sketch and labeling.
3. Inspection of a composite boiler. Preparation of a sketch and labeling.
4. Overhauling of a safety valve, preparation of a sketch and labeling.
5. Study of the burner arrangement of a Boiler, preparation of a sketch and labeling.
6. Study of a soot blower, preparation of sketch and labeling.

Theory Examination:

1. Question paper will comprise of total seven question, each of 20 Marks
2. Only five question need to be solved.
3. Question one will be compulsory and based on maximum part of syllabus.
4. Remaining questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
5. In question paper weightage of each module will be proportional to number of respective lecture hours as mentioned in the syllabus.

Oral Examination:

Oral examination will be based on above syllabus.

Term Work:

Term work shall consist of minimum 05 assignments and written test. The distribution of marks for term work shall be as follows:

- Laboratory work (experiments/assignments): ..... 10 Marks.
- Test (at least one): ..... 10 Marks.
- Attendance (practical & theory): ..... 05 Marks.

TOTAL: ..... 25 Marks.

Text Books:

1. Marine Steam Boilers by S. H. Milton, Newnes-Butterworhts
2. Marine Boilers by G. T. H. Flanagon, Butterworth Heinemann, Indian Reprint.
3. Steam Engineering Knowledge, Vol. 9, Reed's

References:

1. The Running and Maintenance of Marine Machinery by J. Cowley, IMarEST, London
2. Rules and Regulations of any classification Society.

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