



COURSE DELIVERY PLAN - THEORY

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Department of Marine Engineering		LP: MR18701
B.E/ B.Tech /M.E/ M.Tech : MARINE Regulation: 2018		Rev. No: 01
PG Specialisation : N/A		Date: 08.07.2021
Sub. Code / Sub. Name : MR18701 MARINE SYSTEMS AND MACHINERY DESIGN		
Unit: I SLIDING AND ROLLING CONTACT BEARINGS		

Unit Syllabus: Journal bearings, thrust bearings, friction in journal bearings, bearing loads, bearing design using various equations. Thermal Equilibrium. Rolling bearing -Load ratings, types of radial ball bearings selection of bearings, lubrication of ball and roller bearings, methods of failure.

Objective: The students are able to design different types of sliding and select suitable rolling bearing from given data.

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Journal bearings	3-Chpt26 Pg 963-973	PPT / BB
2.	Thrust bearings	3-Chpt26 Pg988-992	PPT / BB
3.	Friction in journal bearings	3-Chpt26 Pg977	PPT / BB
4.	Bearing loads	3-Chpt26 Pg963	PPT / BB
5.	Bearing design using various equations	3-Chpt26 Pg974-979	PPT / BB
6.	Thermal Equilibrium	3-Chpt26 Pg977	PPT / BB
7.	Rolling bearing	3-Chpt26 Pg996-1001	PPT / BB
8.	Load ratings	3-Chpt26 Pg 1003-1010	PPT / BB
9.	Types of radial ball bearings	3-Chpt26 Pg963	PPT / BB
10.	Selection of bearings	3-Chpt26 Pg 1012	PPT / BB
11.	Lubrication of ball and roller bearings	3-Chpt26 Pg 1018	PPT / BB
12.	Methods of failure.	https://www.skf.com/binary/86-62751/RTB-1-06-Bearing-investigation	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR18701 MARINE SYSTEMS AND MACHINERY DESIGN**

Unit: II **SPUR, HELICAL, BEVEL AND WORM GEARS**

Unit Syllabus: Basic design principles of spur gears, helical gears, dynamic tooth loads, design for strength and wear. Basic design principles of bevel gears and worm gears. Lewis and Buckingham equations, thermal rating of worm gears

Objective: The students should be able to design a suitable gear for the given data.

Session No *	Topics to be covered	Ref	Teaching Aids
13	Basic design principles of Spur gears	3-Chpt28 Pg 1021-1044	PPT / BB
14	Basic design principles of Helical gears	3-Chpt29 Pg 1066-1077	PPT / BB
15	Dynamic tooth loads	3-Chpt28 Pg 1040	PPT / BB
16	Design for strength and wear.	3-Chpt28 Pg 1042	PPT / BB
17	Lewis equations	3-Chpt28 Pg 1037	PPT / BB
18	Buckingham equations	3-Chpt29 Pg 1069	PPT / BB
19	Basic design principles of Bevel gears	3-Chpt30 Pg 1080-1098	PPT / BB
20	Basic design principles of Worm gears	3-Chpt31 Pg 1101-1113	PPT / BB
21	Lewis & Buckingham formula.	3-Chpt28 Pg 1037	PPT / BB
22	Thermal rating of worm gears	3-Chpt31 Pg 1110	PPT / BB
23	Solving problems	3-Chpt28,29,30,31	PPT / BB
24	Solving problems	3-Chpt28,29,30,31	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR18701 MARINE SYSTEMS AND MACHINERY DESIGN**

Unit: III DESIGN CRITERIA FOR IC ENGINE PART

Unit Syllabus: Piston, connecting rod with bearings, crankshaft, flywheel and rocker arms.

- **Objective:** The students will be able to understand design criteria for various parts of marine IC Engine.

Session No *	Topics to be covered	Ref	Teaching Aids
25	Piston types	3 Chpt 32 Pg1132-1143	PPT / BB
26	Design criteria for Piston	3 Chpt 32 Pg1132-1143	PPT / BB
27	Connecting rod	3 Chpt 32 Pg1144-1155	PPT / BB
28	Big end bearing	3 Chpt 32 Pg1153-1155	PPT / BB
29	Small end bearing	3 Chpt 32 Pg1153-1155	PPT / BB
30	Crankshaft Built Types	3 Chpt 32 Pg1161-1175	PPT / BB
31	Design criteria for crankshaft	3 Chpt 32 Pg1161-1175	PPT / BB
32	Design criteria for crankshaft	3 Chpt 32 Pg1161-1175	PPT / BB
33	Flywheel Types, Applications	3 Chpt 22 Pg 776-793	PPT / BB
34	Design criteria for a flywheel	3 Chpt 22 Pg 776-793	PPT / BB
35	Design criteria for a flywheel	3 Chpt 22 Pg 776-793	PPT / BB
36	Rocker arm	3 Chpt 32 Pg1192-1199	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR18701 MARINE SYSTEMS AND MACHINERY DESIGN**

Unit: IV **VALVES & LIFTING DEVICES IN ENGINE ROOM**

Unit Syllabus: Valves, safety valves and reducing valves - crane hooks, lifting chains, chain blocks, E.O.T.
Crane

- **Objective:** The students will be able to understand design requirements, construction, working of various valves, cranes, hooks, Lifting chains etc.

Session No *	Topics to be covered	Ref	Teaching Aids
37	Types of Valves- Construction	3Chpt 32 Pg 1190-1192	PPT / BB
38	Safety valves-Types	3Chpt 18 Pg 915-934	PPT / BB
39	Design criteria of Safety valves	3Chpt 18 Pg 915-934	PPT / BB
40	Reducing valves -Types	3Chpt 18 Pg 915-934	PPT / BB
41	Design criteria of Reducing valves	3Chpt 18 Pg 915-934	PPT / BB
42	Crane hook	3Chpt 5 Pg137-144	PPT / BB
43	Crane hook-Numerical	3Chpt 5 Pg137-144	PPT / BB
44	Lifting Chains	https://hoistsandcrane.com	PPT / BB
45	Chain Blocks	https://hoistsandcrane.com	PPT / BB
46	EOT crane Safety features	https://hoistsandcrane.com	PPT / BB

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: **MR18701 MARINE SYSTEMS AND MACHINERY DESIGN**

Unit: V **DESIGN CRITERIA FOR MARINE SYSTEMS**

Unit Syllabus: Water cooling systems for diesel engines and steam plants. Lubricating oil systems for propulsion and auxiliary engines. Electro hydraulic steering gear system including rudder, rudderstock, tiller rams. Marine Diesel Engine air starting system including air receiver, compressors and air starting valves. Marine Diesel Engine Scavenge and Exhaust systems. Marine diesel Engine fuel injection system including fuel pumps and fuel injectors. Power transmission system including thrust blocks intermediate shaft and tail end shaft. Steam turbine plants. Gas turbine plants.

Objective: The students will be able to understand requirements of design criteria for various marine systems.

Session No *	Topics to be covered	Ref	Teaching Aids
47	Water cooling systems for diesel engines	6Chp 5 pg 85-110	PPT / BB
48	Water cooling systems for steam plants	4Chp 1 pg 75-77	PPT / BB
49	Lubricating oil systems for propulsion engines.	2Chp 1 pg 54-71	PPT / BB
50	Lubricating oil systems for auxiliary engines.	2Chp 1 pg 54-71	PPT / BB
51	Electro hydraulic steering gear system including rudder, tiller.	4Chpt 9 Pg286-298	PPT / BB
52	Electro hydraulic steering gear system including rudder, tiller.	4Chpt 9 Pg286-298	PPT / BB
53	Air starting system including air receiver, compressor, air starting	6Chpt5 Pg85-110	PPT / BB
54	Scavenge and Exhaust systems	6Chpt3 Pg30-41	PPT / BB
55	Fuel injection system including fuel pumps and fuel injectors.	6Chpt5 Pg85-110	PPT / BB
56	Fuel injection system including fuel pumps and fuel injectors.	6Chpt5 Pg85-110	PPT / BB
57	Power transmission system including thrust blocks intermediate shaft and tail end	4Chpt 8 Pg245-262	PPT / BB
58	Power transmission system including thrust blocks intermediate shaft	4Chpt 8 Pg245-262	PPT / BB
59	Steam turbine plants	4Chp1 pg 61-70	PPT / BB
60	Gas turbine plants	5Chp31 pg829 - 850	PPT / BB
Content beyond syllabus covered (if any):			

* Session duration: 50 minutes



Sub Code / Sub Name : **MR18701 MARINE SYSTEMS AND MACHINERY DESIGN**

TEXT BOOKS:

- 1.Jindal U.C. ‘Machine Design’ 1st Edition, Pearson 2010.
2. Krishna Rao,T, “Design of Machine Elements “ Ist edition Vol 2 IK International Publishing Pvt Ltd
- 3.A text book of Machine Design by RS Khurmi & JK Gupta 25th edition publishers S Chand
- 4.Marine Auxiliary machinery by H.D.Mc George Butter-worth Publications 9th Edition.

REFERENCES:

1. Indian register of shipping Part1to part7,”Rules and regulations & classification of steel ships 1st Edition Mumbai.
- 2.SamHadad, Neil Watson “ Design and application in diesel engines”,1st Edition,Ellis Horwood ltd.
- 3.Pandya & Shah, “Machine Design”,13 edition,Charotor Publishing house ,Gujarat 1997.
- 4.”Marine Steam power plant” – Shiven Arora, Random Publications,New Delhi 2014.
- 5.Pounders Marine Diesel engine & Gas Turbines, Doug woodyard- 9th Edition,London.
6. Diesel Engine – A J Wharton ,Butterworth publication 3rd Edition.

	Prepared by	Approved by
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Date		
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Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD