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***B.Tech. Degree V Semester Regular/Supplementary Examination in
Marine Engineering November 2024***

**19-208-0502 MARINE BOILERS AND STEAM ENGINEERING
(2019 Scheme)**

Time: 3 Hours

Maximum Marks: 60

Course Outcome

On successful completion of the course, the students will be able to:

- CO1: General considerations governing the design of boilers, smoke tube and water tube boilers.
 CO2: Waste heat boilers, boiler mountings and accessories.
 CO3: Operation, care and maintenance, refractory, fuel burning.
 CO4: Steam engineering and turbines, lay out of plant, selection of materials, constructional details.
 CO5: Condensers, operation and maintenance.

Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 – Analyze, L5 – Evaluate,
 L6 – Create

PI – Programme Indicators

(Answer *ALL* questions)

(5 × 15 = 75)

		Marks	BL	CO	PI
I.	(a) Write the advantages and disadvantages of water tube boiler and fire tube boiler. Explain the reasons for pressure limitation in fire tube boilers.	8	L2	1	2
	(b) Explain the need for compensation for holes that are cut in the shell of a boiler. State the regulation concerning compensation.	7	L2	1	3
OR					
II.	(a) Explain circumferential and longitudinal stress in the boiler shell and how it is applied in the design of manhole opening.	8	L2	1	5
	(b) Explain with a sketch, how stay tubes and plain tubes are attached to the tube plate in a Scotch boiler.	7	L3	1	3
III.	(a) Sketch and describe a Cochran Composite Boiler suitable for producing low pressure steam for auxiliaries.	9	L3	2	3
	(b) State the purpose of blowing through boiler gauge glass. Also explain the procedure of blow through with the help of a diagram.	6	L3	2	4
OR					
IV.	(a) Draw the line diagram of a waste heat boiler. Mark the flow direction of exhaust gas, boiler water, feed water and steam. Mention the various relevant temperatures.	9	L2	2	4
	(b) (i) Why safety valves are fitted in pair and in one chest? Explain.	6	L3	2	2
	(ii) What is the purpose of boiler air vent? When is it opened and closed?				

(P.T.O.)

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		Marks	BL	CO	PI
V.	(a) Explain briefly, how a water tube boiler is prepared for survey? Also explain, how hydraulic pressure test is carried out?	9	L4	3	2
	(b) Sketch and describe a Viscotherm.	6	L2	3	3
OR					
VI.	(a) Briefly explain different types of boiler fuel oil atomizers. Sketch any one type of atomizer.	9	L4	3	4
	(b) What are the reasons for boiler refractory failure? Also explain the steps to be taken for minimizing failure.	6	L1	3	3
VII.	(a) Explain the basic parts of a steam turbine with a neat sketch.	9	L5	4	2
	(b) Sketch and describe the general engine room lay out of a modern steam power plant with the auxiliaries.	6	L4	4	3
OR					
VIII.	(a) What is compounding in turbine? Write briefly about pressure compounding or velocity compounding in a steam turbine with a diagram showing velocity and pressure in stages.	9	L4	4	3
	(b) Explain different types of blade fastening on turbine rotor.	6	L4	4	4
IX.	(a) Explain the procedure of warming through a steam turbine. Why is it required?	9	L3	5	3
	(b) Briefly explain vibration in marine steam turbine.	6	L3	5	4
OR					
X.	(a) What are the probable reasons for sudden loss of vacuum in a vacuum condenser? State the methods to identify the location of leaks.	9	L4	5	2
	(b) State the differences between surface condenser and jet condenser.	6	L2	5	3

Bloom's Taxonomy Level

L1 – 4%, L2 – 29%, L3 – 28%, L4 – 32%, L5 – 7%.
