

Model Question Paper-1 with effect from 2019-20 (CBCS Scheme)

USN

--	--	--	--	--	--	--	--	--	--

Fourth Semester B.E. Degree Examination Marine Heat Engine and Air Conditioning

TIME: 03 Hours

Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.

Module -1			*Bloom's Taxonomy Level	Marks
Q.01	a	Define the following terms related to reciprocating compressor: i) Single Stage and Multi Stage Compressor, ii) Compressor Capacity, iii) Volumetric Efficiency, iv) Clearance Volume	L1	08 Marks
	b	Discuss the advantages of multistage compressor.	L2	05 Marks
	c	Derive an expression for volumetric efficiency of compressor in terms of clearance ratio, pressure ratio, and index of compression.	L3	07 Marks
OR				
Q.02	a	Define the following with respect to a reciprocating compressor: i) Free air delivered (FAD), ii) Pressure ratio, iii) Mechanical efficiency.	L1	06 Marks
	b	Why intercooling is necessary in multistage compression.	L2	06 Marks
	c	Derive an expression for work done for a single stage, single acting reciprocating compressor without clearance volume for polytropic process.	L3	08 Marks
Module-2				
Q. 03	a	Define the following terms: i) Refrigeration, ii) Refrigerating effect	L1	04 Marks
	b	Draw the flow diagram of a simple vapour compression refrigeration system and explain its working. Represent the process on T-S and P-H diagrams.	L2	10 Marks
	c	1.5 KW per ton of refrigeration is required to maintain a temperature of -40 °C in the refrigerator. If the refrigerator works on Carnot cycle, determine the following: i) COP of the cycle, ii) temperature of the sink and iii) Heat rejected to the sink per ton of refrigeration.	L3	06 Marks
OR				
Q.04	a	List commonly used refrigerants in industries.	L1	02 Marks
	b	Write a brief note on properties of refrigerants.	L2	10 Marks
	c	Explain the methods to improve COP of refrigeration system.	L3	08 Marks
Module-3				
Q. 05	a	What are the needs for refrigeration system on board ship?	L1	04 Marks
	b	Explain the construction and working of ship's refrigeration system.	L2	12 Marks
	c	Discuss briefly about HP cutout and LP cutout for compressor.	L3	04 Marks
OR				
Q. 06	a	What do you mean by refrigerant, refrigeration and refrigerator?	L1	06 Marks
	b	With a neat sketch explain the working principle of oil separator.	L2	07 Marks
	c	Write a note on charging of refrigeration plant.	L3	07 Marks

Module-4				
Q. 07	a	What are the basic functions of ship's air conditioning system?	L1	04 Marks
	b	Explain with a neat sketch, the working of container cooling system.	L2	06 Marks
	c	Show the following processes on psychrometric chart: a) Sensible Heating and Cooling, b) Heating and humidification	L2	10 Marks
OR				
Q. 08	a	Define: a) dew point, b) specific humidity, c) relative humidity.	L1	06 Marks
	b	Explain with a neat sketch, the working of ship's air conditioning system	L2	14 Marks
Module-5				
Q. 09	a	What is a heat exchanger? Give examples.	L1	04 Marks
	b	Explain the types of heat exchanger.	L2	06 Marks
	c	Derive an expression for LMTD for a parallel flow of heat exchanger.	L3	10 Marks
OR				
Q. 10	a	Define i) Condenser, ii) Evaporator	L1	04 Marks
	b	Explain shell and tube type heat exchanger.	L2	06 Marks
	c	16.5 kg/s of the product at 650°C ($C_p = 3.55 \text{ KJ/Kg } ^\circ\text{C}$) in a chemical plant, are to be used to heat 20.5Kg/s of the incoming fluid from 100°C ($C_p = 4.2 \text{ KJ/Kg } ^\circ\text{C}$). If the overall heat transfer coefficient is $0.95 \text{ KW/m}^2 \text{ } ^\circ\text{C}$ and the installed heat transfer surface is 44 m^2 , calculate the fluid outlet temperature for the counter flow arrangement.	L3	10 Marks