

EXAM QUESTIONS BEGINS

Write a short answer on the following questions (2 point each):

- 1) The importance of draught in the design of ice-going ships?
- 2) Compare the pros and cons for selecting either a diesel engine or diesel-electric engine for an icebreaker
- 3) What is so called iceknife and why some ice-going ships have one?

EXAM QUESTION ENDS

MODEL ANSWER BEGINS

Example model answers to above questions. Most important part underlined.

- 1) The draught will determine the extent of hull ice-strengthening. Too low draught and bad design will cause additional resistance as the bulbous bow will break the ice. Can have effect how much ice goes to propeller
- 2) Pros for diesel engine: smaller cost, less space Cons: Less torque with smaller revolutions, but in practice the diesel-electric is the only possibility as the overtorque is needed even though it is more expensive. Some icebreakers have diesel engine and heavy spinning wheel, it is possible but rare
- 3) Ice knife is above the rudder to prevent it for ice damage when going backwards.

MODEL ANSWER ENDS

GRADING INSTRUCTIONS BEGIN

2 point for correct answer for each topic and 1 if only part of the possible topics mentioned

GRADING INSTRUCTIONS END

EXAM QUESTIONS BEGINS

Write a short summary (≈1000 words) about the possible effect of climate change on winter navigation and other maritime activities in freezing seas worldwide in the future. (6P)

EXAM QUESTION ENDS

MODEL ANSWER BEGINS

It is important to mention at least: less ice but more dynamic and big scatter, increased maritime traffic, increased risks with low ice class vessels, increased wind power on ice covered waters, increased passenger traffic, EEDI ships will require more icebreakers

MODEL ANSWER ENDS

GRADING INSTRUCTIONS BEGIN

1 point for each topic mentioned above

GRADING INSTRUCTIONS END

EXAM QUESTION

EXAM QUESTIONS BEGINS

Write a short answer on the following questions (3 point each):

- 1) List the main principles used in various ice-strengthening rules to determine the strength limit states of structures (3P)
- 2) The new Polarcode came into force 1.1.2017, describe shortly the used approach to determine the used load level in the new Polarcode (3P)

EXAM QUESTIONS ENDS

MODEL ANSWER BEGINS

- 1) Finnish-Swedish: Elastic design, PC-rules: Plastic design, Russian: Not clearly specified, Canadian: Plastic design
- 2) Modified Popov by Daley, Glancing impact, Crushing energy based

GRADING INSTRUCTIONS BEGIN

1 point for EACH topic mentioned above

GRADING INSTRUCTIONS END