

3. Which is the best arrangement for uniting web frames and stringers at their intersections? Give a sketch in illustration.
4. A vessel was inclined, in smooth water, to ascertain her initial stability, when it was found that by moving a weight of 40 tons across the deck a distance of 20 ft. she heeled from the vertical to an angle of 4° . Her displacement being 7,500 tons, what was her metacentric height?
5. Find by Simpson's "First Rule" the area of the waterplane of a vessel 200 ft. long whose half-ordinates measure 0.4, 7.6, 10.4, 14.8, 15.2, 13.6, 10.8, 7.8, and 2.2 ft. respectively.

6. METEOROLOGY.*

Time allowed $1\frac{1}{2}$ hours.

1. What are the principal causes which disturb the equilibrium of the atmosphere and produce winds?
2. What effect has height upon the temperature of the air? State the reason for this.
3. What are gusts and squalls, and how are they caused?
4. Describe what is known as a V-shaped depression.
5. State which is the dangerous and which the navigable semicircle in tropical revolving storms. Give your reasons for this.
6. Your ship is hove to on the starboard tack, heading north in the Northern Hemisphere, and the indications lead you to believe that a cyclone is approaching: supposing the wind to change to the north-east, what action would you take? State your reasons.

7. CHART.

Time allowed 3 hours.

1. Early one morning during neap tides and about half an hour before high water at Dover, when steering S. 30° W. by compass, Great Castle Head lights were observed in transit bearing N. 63° E. The log then registered $97\frac{1}{2}$ m. $16\frac{1}{2}$ minutes later the red sector of Smalls light was entered, and after an interval of 46 minutes the light turned white, log 110. The course was then altered to N. 4° E. by compass. On this course South Bishop Lt.-Ho. and Hill 444 (Ramsey Island) were observed in transit when abeam. When the log showed 122 the course was altered to N. 63° E. by compass, and soon afterwards Ramsey Hill opened eastward of North Bishop, bearing S. 19° E. When the log showed 146, Strumble Head Lt.-Ho. bore S. 3° W. by compass, and Kemmaes Head bore S. 71° E. by the same compass.

Project the above traverse, making due allowance for tidal drift as indicated on the chart, and find the position of the ship at the time of leaving the red sector of Smalls light. Find also the distances from South Bishop and Strumble Head light-houses when abeam, the total distance made good, and the average speed, and also the deviation on each course steered.

2. Find the course to steer by compass, using deviation-card No. 5, in order to counteract the effect of the tidal stream as indicated on the chart 4 hours after high water at Dover, 10th September, 1925, ship steaming 12 knots, to reach Mid-channel Rock buoy, from the following position: Smalls Lt.-Ho. 57° , Barrels Rock 46° , Grassholm I. right extreme.
3. On 7th September, 1925, at 06 h. 45 m. standard time, being off Fishguard, took a cast of the lead and found the depth to be 19 fathoms:

Required—The depth marked on the chart in the position when the cast was obtained.

8. ESSAY.*

Time allowed 2 hours.

A suitable technical subject will be selected by the Examiner.

193. Specimen Set of Examination-papers for Extra Master :—

1. NAVIGATION AND NAUTICAL ASTRONOMY.

Time allowed 3 hours.

1. On 15th January, 1925, at 19 h. 03 m. apparent time at ship, in lat. by account $34^\circ 58' S.$, long. $85^\circ 45' E.$, the sun set bearing by compass S. 76° W.

* One of these papers will be omitted.