NATIONAL SENIOR CERTIFICATE EXAMINATION
MAY/JUNE 2021

NAUTICAL SCIENCE: PAPER I

MARKING GUIDELINES

Time: 3 hours Marks: 150

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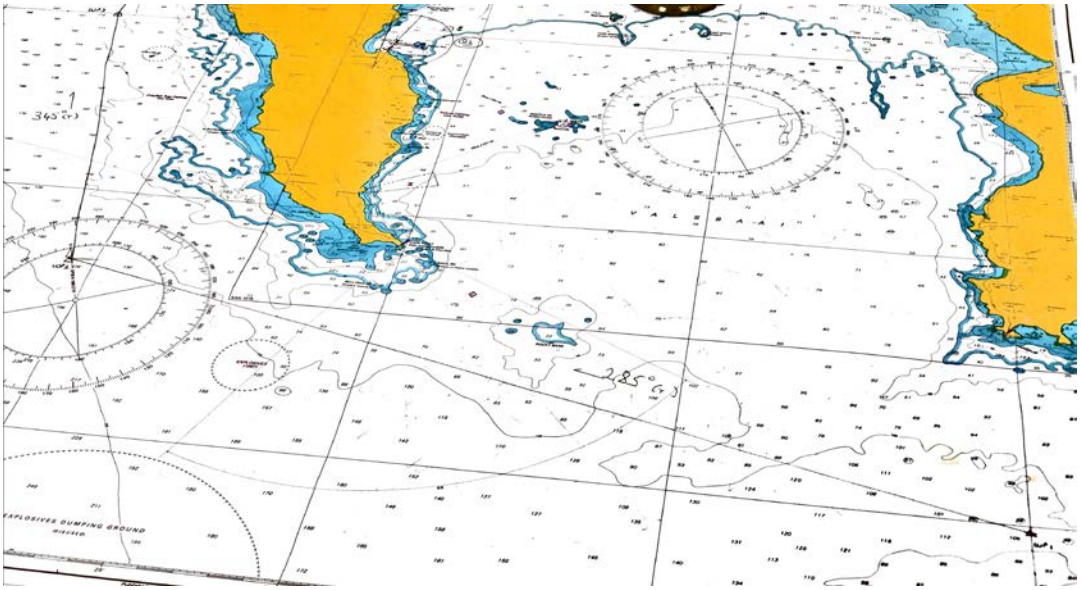
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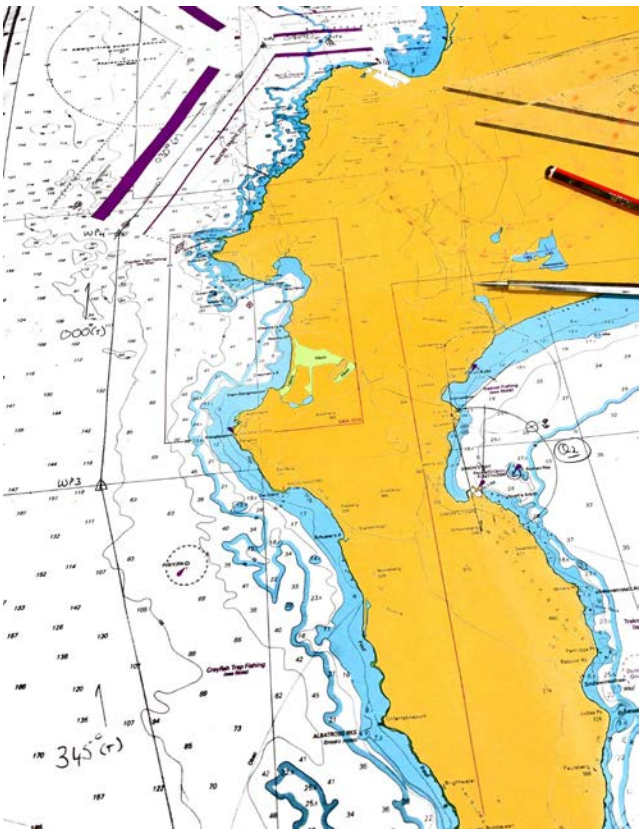
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SECTION A PRACTICAL CHART WORK

QUESTION 1

1.1 Chart work





1.2

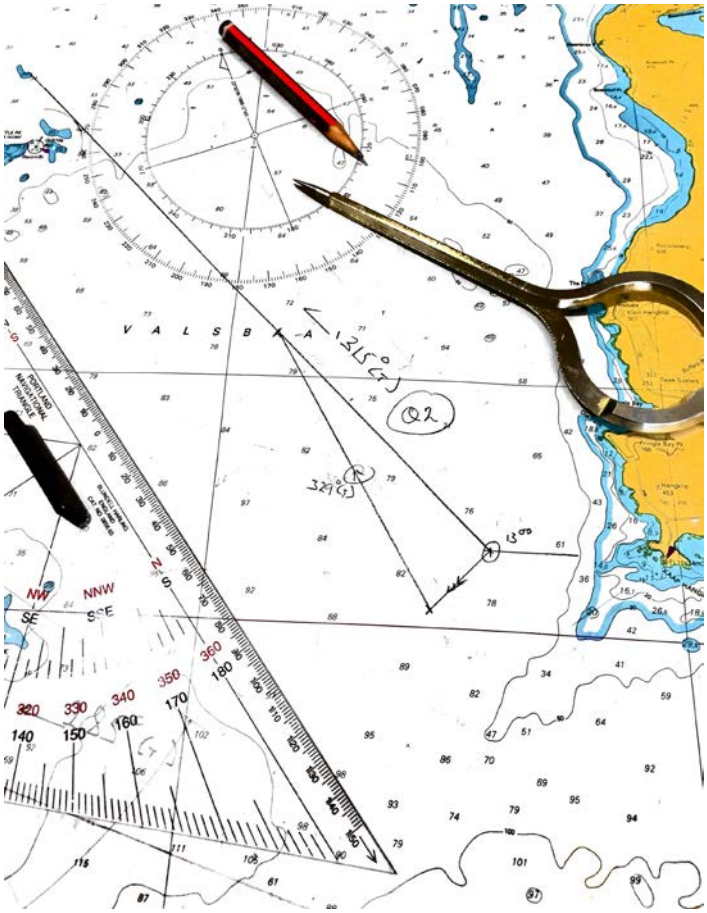
WAY POINT	POSITION	COURSE (T)	DISTANCE (miles)
WP 1	34° 30,2'S 018° 50,0'E	285°	26,8
WP 2	34° 23,3'S 018° 19,0'E	346°	13,8
WP 3	34° 10,0'S 018° 15,0'E	000°	9,0
WP 4	34° 01,0'S 018° 15,0'E	030°	10,0
WP 5	33° 52,5'S 018° 21,0'E	090°	2,5
WP 6	33° 52,5'S 018° 24,0'E	Pilot Station	

1.3 Total distance = 62,1 miles
@ 16 kts = 3hrs 53mins

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QUESTION 2

2.1 Chart work



From 13:00 position to Whittle Rock abeam 1 M	=	315° × 13'
True course to steer to counter current	=	329° (T)
Variation	=	24° W
Magnetic course	=	353° (M)
Deviation	=	2° E
Compass course	=	<u>351° (C)</u>

2.2	Distance over ground in ½	=	5,8'
	Speed over ground	=	11,6 knots
	Distance to Whittle Rock abeam	=	12,8 M
	@ 11,6 kts	=	1h 6m
	ETA Whittle Rock abeam	=	<u>14:06</u>

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QUESTION 3

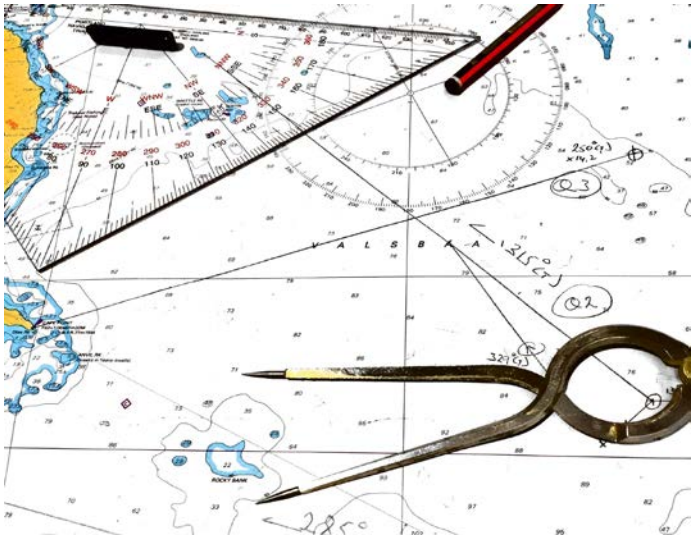
Sextant angle	=	01° 12,5'	Height of Lt.Hse	=	87,00 m
i.e.	=	1,2' (on)	State of tide	=	0,79 m (1,79 – 1)
Observed angle	=	01° 11,3'	Corrected height	=	86,21 m

Dist off Lt. Hse = {86,21 × 1,86} / 71,3
= 2,2 miles

Compass brg = 270° (C)
Dev = 4° E
Magnetic brg = 274° (M)
Variation = 24° W
True brg = 250° (T)

Position 34° 20,6' S 018° 32,3' E

Chart work



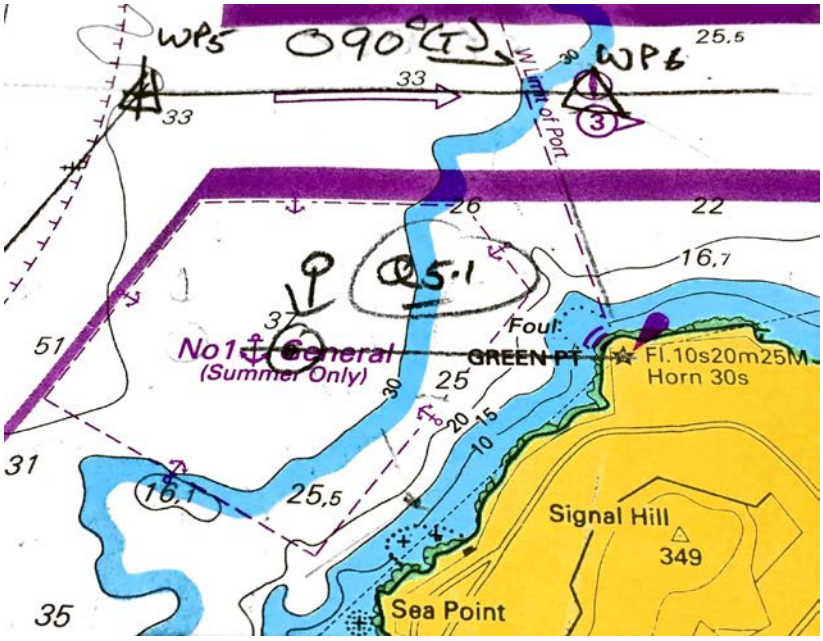
QUESTION 4

Draught	=	3,2 m	
Clearance	=	2,0	
Depth required	=	5,2	
Chart depth	=	3,9	
Height of tide	=	1,3 m	
From the Tide Tables, cross at		07h 24m	1 December
Steaming time from the berth	=	00h 45m	
Latest time to depart the berth	=	06h 39m	1 December

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QUESTION 5

5.1 A suitable anchorage recommended on the chart for summer is west of Green Point Lt Hse., e.g. Green Pt. Lt. bearing 090° × 1,6 miles.



5.2 The variation to apply is

1999 Var		23° 35' W
2' W p.a. × 9 years	=	18' W
2008 Var.	=	23° 53' W

Note: The variation and year may differ depending on the updated chart used. Markers refer to the particular chart used by the candidate.

5.3 Whittle Rock Racon buoy has top mark two cones points outwards or diametrically opposed indicate safe water to pass to the East of the buoy.

5.4 Slangkoppunt Lt Hse
Group flash White light flashing sequence 4 every 30 seconds;
Height of the light is 41 meters above MHWS;
Range of visibility is 30 miles.

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SECTION B ASTRO-NAVIGATION

QUESTION 6

6.1

Chron	=	08h 53m 23s	GHA	=	299° 04,0'	Dec	=	12°54,9' N
error (slow)	=	00 00 45 +	Inc 52m 38s	=	013° 32,0'	'd'	=	,7' -
GMT at obs.	=	08 54 08	GHA	=	312° 36,0'	Dec	=	12º54,2' N
			Long E	=	010° 05,0' +			
			LHA	=	322° 41,0'			

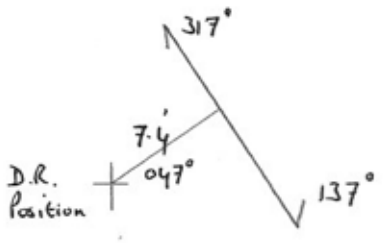
sin θ° = cos LHA × cos Lat × cos Dec ± sin Lat × sin Dec
= cos 322° 41,0' × cos 28° × cos 12°54,2' – sin 28° × sin 12°54,2'
= 0,68447 – 0,1048
= 0,579637564
θ° = 35° 25,6'

Sext Alt	=	35° 23,7'
Index error	=	1,0' –
Obs. Alt	=	35° 22,7'
Dip (6,2m)	=	4,4' –
App. Alt.	=	35° 18,3'
Total error	=	14,7' +
TrueAlt.	=	35° 33,0'
Calc. Alt.	=	35° 25,6'
Intercept	=	7,4' towards

A	=	0,699 N
B	=	0,378 N
C	=	1,077 N

Az.	=	N 47° E 047°
P/L	=	137°/317°

6.2 **Plot position line**

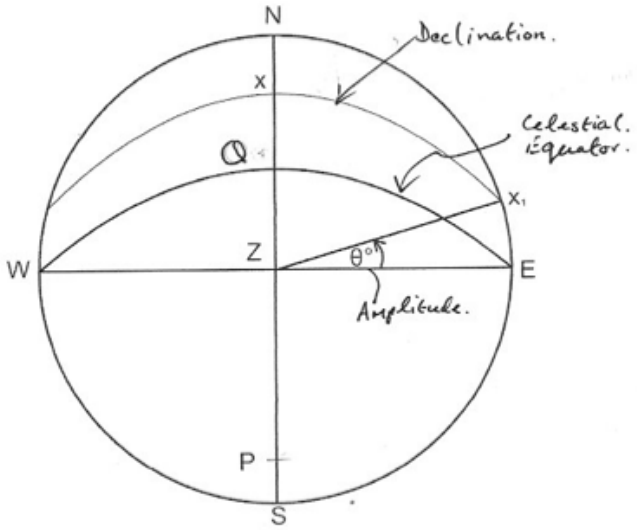


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QUESTION 7

7.1	7.1.1	LMT Sunrise	=	06h 28m	Dec	=	12° 57,3' N	Sin Amp	=	sin Dec/ cos Lat
		Long in time	=	41m -	'd'	=	,6 -		=	sin 12° 56,7'/cos 27° 30'
		GMT Sunrise	=	05h 47m	Dec	=	12° 56,7' N		=	0,253
		Zone	=	1h				Amp	=	E 14,6° N
		Zone Time	=	06 47						075½°
	7.1.2	True brg	=	075½°				Ship's Head	=	302° (C)
		Compass brg	=	085°				Comp. error	=	9½° W
		Compass error	=	9½° W				True head	=	292½° (T)
	7.1.3	Variation	=	24° W						
		Deviation	=	14½° E						

7.2



Total: 150 marks

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