(Paper Format)

Duration: 3 hrs. **SECOND MATE (F.G.)** Maximum Marks: 100

Pass Marks: 50

METEOROLOGY

Note: 1. USE WEATHER CODE _____

2. QUESTION 1 IS COMPULSORY. ATTEMPT ANY 4 OUT OF REMAINING 5 QUESTIONS.

3. ALL QUESTIONS CARRY EQUAL MARKS

Q1. CODING or DECODING (COMPULSORY QUESTION)

Q2. A. CALCULATION OF TRUE AND APPARENT WIND

B. THEORY ON WIND

Q3. SHIP BORNE METEOROLOGICAL INSTRUMENTS

Q4. ATMOSPHERE/ ATMOSPHERIC PRESSURE/

Q5. CLOUDS/ VISIBILITY/ CLIMATOLOGY

Q6. WEATHER SYSTEMS/ SEA AND SWELL/ WEATHER FORECASTING

Please note that the above format is only an indicative of the examination paper. The candidates are advised to refer to detailed teaching syllabus and the course outline.

GOVERNMENT OF INDIA

PM Paper **Date: - 10th Nov-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather observations taken on a vessel at 1750 IST on 4th January, when the vessel was at 50° 12'N 030° 17'W:
Ship: ATGV, wind speed estimated at 42 knots
Height of the base of lowest cloud is 300 meters
Horizontal visibility is 0.21 nautical miles
The sky is fully covered by clouds
The wind blowing from 090° (T)
Air temperature is + 7.5° C, Dew point temperature is + 7.2° C
Barometric pressure is 995.2 hpa, The barometer has fallen steadily in the last 3 hour decreasing by 2.1 hpa.
There is intermittent moderate rain (not freezing) at the time of observation, vessel experienced drizzle and rain since 1150 IST.
A layer of nimbostratus clouds covers the sky.
The ship's course is 270° and speed 14 knots.
The sea temperature (measured by intake) is + 7.0° C.
Sea waves are estimated to be 5m high, with a period of 10 seconds, the swell waves are coming from 180° (T), height 4m, period 16 seconds.
The wet bulb temperature is + 7.4° C.

Q.2 a) On a course of 154° at 13 knots, an anemometer on the bridge showed a wind speed of 32 knots. The direction of wind by observing line of waves was WSW. What entry is to be made in the deck logbook with respect to wind direction and speed? If an observer on the vessel threw up a piece of paper, in which direction would it fly off?
b) State Buy Ballot's Law. Explain the precautions to be observed when applying Buy Ballot's Law.

Q.3 Describe Basic principle and working of Aneroid barometer. What are the correction to be applied to its reading before making entry in deck log book? Why Aneroid barometer is preferred over mercury barometer for use on board the ship?

Q.4 Explain Following:
a) Type and formation of fog occurring at Dover strait (English Channel) and Grand Bank of New Found land.
b) How will you predict fog at sea?

Q.5 Describe with sketch formation of:
a) NE Monsoon b) Land and Sea breeze

Q.6 Describe with sketch the process of frontogenesis. What type of weather are associated with cold front and warm front?

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GOVERNMENT OF INDIA

AM Paper **Date: - 10th Nov-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Using the Ship Weather Code, 1982, please code the following weather observations:
Code the following weather report, using the Ship's Weather Code 1982.
Call Sign: ATVQ, Position: 3° 15' S, 015° 13' W steered a course of 090° (T) at 16 knots during last 3 hours. Estimated wind South-Westerly at 10 knots.
On 16th May GMT 13h, 40m, the barometric pressure was 998mb, Barometric tendency 4 mb,
Barograph trace steadily falling, visibility 16km. Temperature dry = 32.5° C, Wet= 29.5° C,
Clouds: 6/8 of the sky. Low clouds Sc 4/8 of the sky; Ac in Chaotic Sky Ci in the form of Filaments as hooks. Present and past weather were not of significance.

Q.2 a) On a ship steering a SW'ly course at 12 knots, funnel smoke was observed to be blowing towards NW, at the same time wind speed estimated by looking at the waves was 35 knots. State the entry to be made in logbook regarding wind direction and speed.
b) Explain Geostropic wind scale.

Q.3 Sketch a whirling Psychrometer. Describe the principle, working and procedure to make an efficient and proper use of the same.

Q.4 Explain the difference between:
a) Advection and radiation fog with examples of each.
b) Hoar Frost and Rime

Q.5 Sketch and describe the weather associated:
a) Cyclone and
b) Anticyclone, in Northern Hemisphere

Q.6 a) Differentiate between Synoptic charts and Prognostic charts.
b) Explain: i) Surface weather charts ii) Ice charts

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GOVERNMENT OF INDIA

PM Paper **Date: - 12th Sept-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Decode the following weather report:

BBXX	VWWL	03003	99369	31799	41498
52222	10285	20208	40102	53022	71652
83524	22273	00206	20802	315//	41004

Q.2 a) A vessel steaming due East at 20 knots in open sea, observes the sea surface and estimates the wind force to be 22 knots. The smoke from the funnel was observed to blow towards South. State what entry is to be made in weather report.

b) Explain geostrophic wind with a sketch.

Q.3 Explain with a neat sketch the principle, use and errors of Aneroid Barometer.

Q.4 a) Write note on:

i) Isobars

ii) Buy's Ballot's law and its limitations

b) Explain Fohn wind effect with a neat sketch.

Q.5 a) Explain with a suitable sketch "Trade Winds" and the reason for these winds on the planetary scale.

b) What is the cause of South-West Monsoon in Indian sub-continent?

Q.6 a) Write note on:

i) Turbulence clouds

ii) Radiation Fog

b) Explain Frontogenesis with a neat sketch.

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GOVERNMENT OF INDIA

AM Paper **Date: - 12th Sept-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Decode the following weather report:

BBXX	VWWL	03003	99369	31799	41498
52222	10285	20208	40102	53022	71652
83524	22273	00206	20802	315//	41004

Q.2 a) A vessel steaming due East at 20 knots in open sea, observes the sea surface and estimates the wind force to be 22 knots. The smoke from the funnel was observed to blow towards South. State what entry is to be made in weather report.

b) Explain geostrophic wind with a sketch.

Q.3 Explain with a neat Sketch the principle, use and errors of Aneroid Barometer.

Q.4 a) Write note on

i) Isobars

ii) Buy's Ballot's law and its limitations

b) Explain Fohn wind effect with a neat sketch.

Q.5 a) Explain with a suitable sketch "Trade Winds" and the reason for these winds on the planetary scale.

b) What is the cause of South-West Monsoon in Indian sub-continent?

Q.6 a) Write note on

i) Turbulence clouds

ii) Radiation Fog

b) Explain Frontogenesis with a neat sketch.

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GOVERNMENT OF INDIA

PM Paper **Date: - 7th July-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following report

A vessel with Call sign AJKT, in posn 01° 25'S, 178° 05'E, Date 22nd Sept 1000 hrs SMT, CMG and SMG in Last 3 hrs: 165° (T), 17 kt. Estimated Wind: 136° (T), 14 kts, Visibility: 16 Km, Atmospheric pressure: 987.6 bpa, Barometric Tendency: +2.5 hpa increasing steadily. Temperature: dry +28°C, Wet: +23°C, Sea: +22°C. Cloud: Fully covered sky with few blue patches, low clouds cover 4 oktas, base 1000 meters, above sea, Cu with little vertical extent and seemingly flattened, Ac in a chaotic sky, Cc alone.

Present Wx: State of Sky on the whole unchanged.

Past Wx: Cloud covering more than ½ of sky throughout period, rain.

Sea period: 07 sec, height 1.5 mtrs, Swell coming from southeast, period 7 sec, height 3 mtrs.

Q.2 a) A vessel on a course of 320° (T) speed 15 knots. The anemometer and wind vane showed 20 knots and 045° (T) respectively. State what entry is to be made in weather report regarding wind direction and speed? In which direction the funnel smoke will be blowing?

b) Explain Pressure Gradient Force and Coriolis Effect.

Q.3 Describe with the help of a suitable diagram the working of an "Aneroid Barometer". Also state the advantages of the Aneroid Barometer over the Mercury Barometer?

Q.4 a) Explain the difference between:

i) Sea and swell; and ii) Mist and Fog.

b) Describe the information contained in the coastal weather bulletin.

Q.5 a) Explain with neat sketch Southwest Monsoon

b) What are the factors to consider when weather routing a ship? What are the advantages of weather routing?

Q.6 Explain the following:

a) Storm surge, b) Significant wave height.

c) Bore tide; and d) Dew Point temperature.

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GOVERNMENT OF INDIA

AM Paper **Date: - 4th July-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following report

A vessel with Call sign A JKT. in posn 01° 25'S, 178° 05'E, Date 22nd Sept 1000 hrs GMT. CMG and SMG in last 3 hrs: 165° (T), 17 kt. Estimated Wind: 136° (T), 14 kts. Visibility: 16 Km. Atmospheric pressure: 987.6 bpa, Barometric Tendency: +2.5 hpa increasing steadily. Temperature: dry +28°C, Wet: +23°C, Sea: +22°C. Cloud: Fully covered sky with few blue patches, low clouds cover 4 oktas, base 1000 meters, above sea, Cu with little vertical extent and seemingly flattened, Ac in a chaotic sky. Cc alone.

Present Wx: State of Sky on the whole unchanged.

Past Wx: Cloud covering more than ½ of sky throughout period, rain.

Sea period: 07 sec, height 1.5 mtrs. Swell coming from south east, period 7 sec. height 3 mtrs.

Q.2 a) Draw a neat sketch illustrating Fohn Wind Effect.

b) Ship course SW x W at 12 kts. True wind observed to be 2 points abaft the starboard beam. The funnel smoke was blowing in a direction 3 points abaft port beam. Find the speed of the true and apparent wind and state what entries will be made in ship's logbook and weather report.

Q.3 Explain with a neat Sketch the principle, use and errors of Aneroid Barometer.

Q.4 Describe in detail seven basic isobaric patterns with the help of suitable sketches.

Q.5 a) Explain what you understand by cold front, warm front and occluded front and how these fronts are formed.

b) Discuss weather that are associated with each of the above kind of fronts.

c) Give necessary diagram

Q.6 a) Explain how advection fog is formed. Give some examples of the region where advection fog forms.

b) Explain formation of orographic clouds.

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GOVERNMENT OF INDIA

PM Paper **Date: - 7th May-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather report using Ship's Weather code 1982:

Call sign "BVV45" in position 03°12'S 015°11'W at 1355 UTC on 16th September, steered a course of 100° at knots. Estimated wind: south westerly at 12 knots. Barometric pressure: 998 mb, barometric trace decreasing and then increasing: no change in last three hours. Visibility 17 km. Temperature: Dry 32.5°C, Wet 29.5°C. Total Clouds ¾ of the sky. Low clouds: Sc ½ of the sky 200 m above sea level: Ac in chaotic sky. Ci in the form of filaments as hooks. Present and past weather were not of significance.

Q.2 a) On a course of 154°(T) at a speed of 13 knots, an anemometer on the bridge showed wind speed of 32 knots. The direction of wind by observing the line of waves was WSW. What entry is to be made in the weather report with respect to wind direction and speed? If an observer on the vessel threw up a piece of paper, in which direction would it fly off?

b) Define Buy Ballot's law? What are the precautions to be observed when applying Buys Ballot's Law?

Q.3 Sketch and describe Whirling Psychrometer. What precautions are required in its use?

Q.4 a) What types of fog do you experience in following geographical area and state the reason why they are formed?

i) Sand heads of River Hooghly ii) East Coast of Japan

b) What do you understand by Orographic Fog?

Q.5 a) Define Dew Point Temperature and explain its application for Cargo Hold Ventilation.

b) Explain various types of precipitation.

Q.6 Explain how meteorological forecasts, synoptic and prognostic charts are used in weather reporting of ship in Trans ocean voyage?

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GOVERNMENT OF INDIA

AM Paper **Date: - 7th May-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather observation taken on vessel at 1750 IST on 4th January, when vessel was at 50° 12'N, 030° 17'W, Ship ATGV, Wind speed 42 Knots Height of the base of the Lowest Cloud is 300 Mts. Horizontal Visibility 2.1 nautical miles. The sky is fully covered by clouds. The wind is blowing from 090°, Air temp. +7.5°C. Dew point temperature +7.2°C. Barometric pressure is 995.2 hPa. The barometer has fallen steadily in the last three hours decreasing by 2.1 hPa. There is intermittent moderate rain (not freezing) at the time of observation. Vessel experienced drizzle and rain since 1150 Hrs IST. A layer of Nimbostratus cloud covers the sky. The ship course is 270° and the speed 14 knots. The sea temperature (measured by intake) is +7.0°C. Sea waves are estimated to be 5 mts high, with a period of 10 seconds, the swell waves are coming from 180°, height 4 mts period 16 seconds. The wet bulb temperature is +7.4°C.

Q.2 a) A vessel steaming due East at 20 knots in open sea, observes the sea surface and estimates the wind force to be 22 knots. The smoke from the funnel was observed to blow towards South. State what entry is to be made in weather report.
b) Explain geostrophic wind with a sketch.

Q.3 Draw a neat sketch of a Barograph & label its parts.

Q.4 a) Write short notes on: i) Isobars ii) Buy's Ballot's law and its Limitations.
b) Explain Fohn wind effect with a neat sketch.

Q.5 a) Write short notes on: i) Turbulence clouds ii) Radiation Fog.
b) Explain Frontogenesis with a neat sketch.

Q.6 a) Explain with a neat sketch Southwest Monsoon.
b) What are the factors to consider when weather routeing a ship? What are the advantages of weather routeing?

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GOVERNMENT OF INDIA

PM Paper **Date: - 5th Mar-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Decode the following weather report:

BBXX	VWWL	03003	99369	31799	41498
52222	10285	20208	40102	53022’	71652
83524	22273	00206	20802	315//	41004

Q.2 a) A vessel on a course of 320° (T) speed 15 knots. The anemometer and wind vane showed 20 knots and 045° (T) respectively. State what entry is to be made in the weather report regarding wind direction and speed? In which direction the funnel smoke will be blowing?

b) Explain Pressure Gradient Force and Coriolis Effect.

Q.3 Describe with the help of a suitable diagram the working of an “Aneroid Barometer.” Also state the advantages of the Aneroid Barometer over the Mercury Barometer.

Q.4 a) Explain the difference between: i) Sea and swell ii) Mist and Fog

b) Describe the information contained in the coastal weather bulletin.

Q.5 a) Explain with a suitable sketch "Trade Winds" and the reason for these winds on the planetary scale.

b) What is the cause of the South-West Monsoon in the Indian sub-continent?

Q.6 Explain the following: a) Storm surge b) Significant wave height

c) Bore tide d) Dew Point temperature

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GOVERNMENT OF INDIA

AM Paper **Date: - 5th Mar-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following:
Ship's Call Sign: ATTK, Posn 14° 31'S 088° 09'W. Date and time of observation: 10th May 1700 IST. Course made good 080° (T) at 15 knots, estimated Wind: NNE, 12 knots (estimated). Visibility: 5 Km. Atmospheric pressure: 1002 mb. Barograph trace: falling then steady, change: 1.7 mb, Dry bulb: 29.5° C, Wet bulb: 28° C, Sea temp: 26° C. Clouds: Nearly overcast. St at 600m above sea level covering 5/8 of sky. Nimbostratus lying above covering most of remaining sky. Present Weather: Thunderstorm with no precipitation. Past weather: Showers and Thunderstorm. Sea: 6 sec, height 0.5 m. Swell from: 180° (T), height 1m, period 10 sec.

Q.2 a) A vessel estimated wind force 7 (33 knots) by watching sea waves. Her course was 076° (T), speed 17 knots. Funnel smoke was blowing towards 352° (T). State, what entry is to be made in log book for wind direction and speed?
b) Describe Buy's Ballot's law and its limitations.

Q.3 Explain the principle, use and errors of Aneroid Barometer. Draw a sketch showing the construction of the aneroid Barometer.

Q.4 a) Write short notes on: i) Isobars ii) Buy's Ballot's law and its veering and baking.
b) With a neat sketch explain Fohn wind effect.

Q.5 a) Write short notes on: i) Turbulence clouds ii) Radiation Fog.
b) With a neat sketch explain Frontogenesis.

Q.6 a) Explain with a neat sketch South West Monsoon.
b) What are the factors to consider when weather routeing a ship? What are the advantages of weather routeing?

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GOVERNMENT OF INDIA

PM Paper **Date: - 6th Jan-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Decode the following using ships weather code 1982:

BBXX	ATJQ	13063	99182	10823	41597
41228	10325	20280	40084	53031	79112
84149	22274	00315	20604	30406	41006

Q.2 A vessel was steering a westerly course at 15 knots. The wind direction and speed displayed by anemometer was 060° (R) on port bow at 10 knots. What entry for true wind is to be made in ships logbook, and weather message respectively?

Q.3 Describe Basic principle and working of Aneroid barometer. What are the corrections to be applied to its reading before making entry in deck log book? Why Aneroid barometer is preferred over mercury barometer for use on board the ship?

Q.4 Explain the followings:

a) Buys Ballot's law.

b) Geostrophic wind scale.

Q.5 What type of cloud is likely to form when atmosphere is "unstable"? State the features of this cloud type and list the likely weather conditions in the vicinity of and under such a cloud.

Q.6 Describe with sketch the process of frontogenesis. What type of weather are associated with cold front and warm front?

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GOVERNMENT OF INDIA

AM Paper **Date: - 6th Jan-2025**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following ship's full reports, Using the ship's Weather Code 1982:

Date and GMT	: 4 May, 1800 GMT
Ship's Call Sign	: ATVH
Ship's Position	: 52°42'N, 020°30'W
Ship's Course/speed	: 180°T/15 knots.
Wind	: 080°T, speed 9 knots estimated
Weather	: Cloudless. No significant phenomenon
Visibility	: 8.8 nautical miles
Barometric pressure	: 1020.3 mb
Barometric tendency	: Increasing then increasing slowly. Changed 0.4 mb in last 3 hrs.
Air temperature	: +14.3°C
Dew point temp	: +6.8°C
Sea temperature	: +13.0°C
Sea waves	: Period 4 seconds: Height 0.8 meter.
Swell	: Dir. 130°T: Period 6 sec: Height 1.5 meters.

Q.2 a) Course 295° speed 16 knots out in open sea. Wind force 4 (18 knots) estimated by appearance of the sea surface. Smoke from the funnel was observed to be blowing to NNE. What entry is to be made in the weather report with respect to wind direction and speed?
b) What is Coriolis force? How does it affect the wind blowing over sea and land?

Q.3) With the help of a neat sketch describe the functioning of an Aneroid barometer, what are the errors possible? List precautions to be taken while using the same?

Q.4) a) What is the difference between Isobars and Isallobars?
b) What is barometric tendency? Explain how it can be used to predict movement of pressure systems?

Q.5) Explain the "Formation of clouds" due to the following:
a) Turbulence b) Convection

Q.6) Enumerate the weather associated with warm front, cold front and occluded front. Draw the symbols used in weather charts to depict these fronts.

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GOVERNMENT OF INDIA

PM Paper **Date: - 8th Nov-2024**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Decode the following weather report:

BBXX	VHAN	16003	99000	10469	41593
70510	10285	20208	40088	53036	70694
84299	22242	00206	20401	327//	40808

Q.2 a) A vessel steering a course of 160°(T) at a speed of 12 Knots, found wind speed of 10 kts from anemometer & funnel smoke was blowing towards 025°(T). Find what entry is needed in Log book?

b) What is Buys Ballot's Law?

Q.3) Describe basic principle and working of Aneroid barometer. What are the correction to be applied to its reading before making entry in deck log book? Why Aneroid barometer is preferred over mercury barometer for use on board the ship?

Q.4) Write short notes on the following (Any Four):

i) Anabatic Wind ii) Fohn Wind iii) Relative and Absolute Humidity

iv) Isobars and Isallobars v) High Latitude depression

Q.5) a) Write the difference between Mist & Fog.

b) Describe various types of Fog and their formation.

Q.6) a) Explain Sea breeze.

b) Differentiate between Synoptic and prognostic Charts?

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GOVERNMENT OF INDIA

AM Paper **Date: - 8th Nov-2024**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather report:
Ship's Name: SS Loyalty, Call Sign: LGMW, Posn: 01°25'S 178°05'E, Date: 17 June, SMT: 2110. CMG & SMG in Last 3 hrs: 165(T), 17 kts Estimated Wind: 136(T), 14 kts, Visibility: 16 Km, Atmospheric pressure: 987.6 hpa, Barometric Tendency: +2.5 hpa increasing steadily.
Temperature: dry +28°C, Wet: +23°C, Sea: +22°C.
Cloud: fully covered sky with few blue patches, low clouds cover 4 oktas base 1000 meters above sea. Cu with little vertical extent and seemingly flattened, Ac in a chaotic sky, Cc alone.
Present Wx: State of sky on the whole unchanged.
Past Wx: Cloud covering more than ½ of sky throughout period, rain.
Sea period: 07 sec, height 1.5 mtrs, Swell coming from south east, period 7 sec, height 3 mtrs.

Q.2 A vessel steaming due East at 19 knots in open sea, observes the sea surface and estimates the wind force to be the lower limit of force 6 (22 knots). A handkerchief held up was observed to blow towards South. State what entry is to be made in the weather report regarding wind direction and speed.

Q.3) Draw a neat sketch and explain the functioning of barograph. What precautions are required to be taken in its care, maintenance and its use?

Q.4) Explain following:
a) Type and formation of fog occurring at Dover strait (English Channel) and Grand Bank of New Found land.
b) How will you predict fog at sea?

Q.5) Describe with sketch formation of:
a) NE Monsoon
b) Land and Sea breeze

Q.6) a) Describe with sketches the process of frontogenesis.
b) Write short notes on various weather bulletins issued by Meteorological Department for the benefit of mariners.

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GOVERNMENT OF INDIA

PM Paper **Date: - 6th Sept-2024**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 A vessel with Call sign AJKT, in posn 01^{O}25'S, 178^{O} 05'E, Date 22nd Sept 1000 hrs SMT, CMG and SMG in Last 3 hrs: 165^{O}(T), 17 kn. Estimated Wind: 136^{O}(T), 14 kts.

Visibility: 16 Km, Atmospheric pressure: 987.6 bpa. Barometric Tendency: +2.5 hpa increasing steadily.

Temperature: dry: +28^{O}C, Wet: +23^{O}C, Sea: +22^{O}C.

Cloud: Fully covered sky with few blue patches, low clouds cover 4 oktas, base 1000 meters, above sea. Cu with little vertical extent and seemingly flattened. Ac in chaotic sky, Cc alone Present Wx: State of Sky on the whole unchanged.

Past Wx: Cloud covering more than ½ of sky throughout period, rain.

Sea period: 07 sec, height 1.5 mtrs, Swell coming from south east, period 7 sec, height 3 mtrs.

Q.2 a) A vessel steaming due East at 20 knots in open sea, observes the sea surface and estimates the wind force to be 22 knots. The smoke from the funnel was observed to blow towards South State what entry is to be made in weather report.

b) Explain with a neat, Geostropic wind.

Q.3) a) Describe the use of anemometer.

b) With a neat sketch of wind rose, discuss the information you will obtain from it.

Q.4) Write short notes on:

i) Convection clouds ii) Sea breeze iii) Prognostic charts iv) Squall

Q.5) Describe with a sketch the weather associated with:

a) Anticyclone b) Col

Q.6) a) Define visibility and how it is estimated at sea?

b) What will be the effect on visibility when cold dry air blows over relatively warm seawater?

c) Differentiate between fog and mist.

**********X***X**********

GOVERNMENT OF INDIA

AM Paper **Date: - 6th Sept-2024**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather observation taken on vessel at 1750 IST on 4th January, when vessel was at 50°12'N, 030° 17'W, Ship ATGV, Wind speed 42 Knots. Height of the base of the Lowest Cloud is 300 Mts. Horizontal Visibility 0.21 nautical miles. The sky is fully covered by clouds. The wind is blowing from 090°, Air temp. +7.5°C, Dew point Temperature +7.2°C, Barometric Pressure is 995.2 hPa. The barometer has fallen steadily in the last three hours decreasing by 2.1 hPa. There is intermittent moderate rain (not freezing) at the time of observation: Vesel experienced drizzle and rain since 1150 Hrs IST. A layer of Nimbostratus cloud covers the sky. The ship course is 270° and the speed 14 Knots. The sea temperature (measured by intake) is +7.0°C. Sea waves are estimated to be 5 mts high, with a period of 10 seconds, the swell waves are coming from 180°, height 4 mts period 16 seconds. The wet bulb temperature is +7.4°C.

Q.2 a) Draw a neat sketch illustrating Fohn Wind Effect.

b) Ship course SW by W at 12 kts. True wind observed to be 2 points abaft the starboard beam. The funnel smoke was blowing in a direction 3 points abaft port beam. Find the speed of the true and apparent wind and state what entries will be made in ship's log book and weather report.

Q.3) Draw a neat sketch of a Barograph & label its parts.

Q.4) Describe in detail seven basic isobaric patters with the help of suitable sketches.

Q.5) a) Explain what you understand by cold front, warm front and occluded front and how these fronts are formed.

b) Discuss weather that are associated with each of the above kind of fronts.

c) Give necessary diagram.

Q.6) a) Explain how advection fog is formed. Give some examples of the region where advection fog forms.

b) Explain formation of orographic clouds.

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GOVERNMENT OF INDIA

Date: - 5th July-2024

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather report:

Call sign ATVH, Position 09^{O}38'N, 068^{O}41'E, Course and Speed made good in last three hours 355^{O}(T) at 18 knots, UTC time 23D 09H 28M: Wind S by W, estimated 22 knots: Visibility 1900 mtrs, Pressure 1006.8 mb, tendency (-) 2.8 mb, Barograph trace decreasing then steady, Temp dry bulb 30^{O}C, wet bulb 22^{O}C, Sea temp. 14^{O}C. Clouds: Sky nearly overcast, low clouds: 5 oktas, base 300 mtrs above sea level, cumulonimbus forming an anvil, Ac resulting from cumulus, Cirrocumulus alone. Present weather-Slight Drizzle, not freezing intermittent, Past weather continuous drizzle, Sea period 05 sec, height 4 mtrs, swell from NW, period 06 sec height 4.2 mtrs.

Q.2 a) A vessel on a course of 310^{O}(T), speed 20 knots, observes the direction of wind by looking at the line of waves as NE. The anemometer at that time showed a speed of 28 knots. State the direction in which the funnel smoke will blow, state what direction and speed of wind is to be entered in the log book. (15 marks)

b) Write a note on Coriolis force. (5 marks)

Q.3) Draw a neat sketch and explain functioning of Barograph. What precautions are required to be taken in its care and maintenance?

Q.4) Write short notes on:

a) SALR

b) Troposphere and Tropopause

c) Relative Humidity

d) Barometric tendency and Isallobars

Q.5) a) Explain with neat sketch how clouds are formed by i) Convection ii) Orographic lifting

b) Explain how Advection fog forms and give examples of areas where you may encounter the same at sea.

Q.6) a) Explain NE Monsoons with a neat sketch.

b) Explain what are Cold Front and Warm front, draw the symbols used on weather map for each? Explain with a neat sketch weather experienced at passage of Cold Front?

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GOVERNMENT OF INDIA

Date: - 3rd May-2024

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather report:
MV "SS Loyalty" in position 22^{O} 11'N 40^{O} 47'W at 1745 UTC on 09th May observed following weather: Wind 000^{O}T speed 12 knots by Anemometer, sea waves 1.75m, period 8 second, swell from 225^{O}T, height 3.5m, period 10 second, Barometric pressure corrected was 1001 mb, deceased steadily in last three hours, Pressure change 1mb. The ship steered a course of 330^{O}(T), speed 15 kts inn last three hours. Present and past weather was not observed Sky: Overcast, with few blue patches, Low Cloud: Sc 4 oktas at 200 m from mean sea level, Ac in a chaotic sky, Cc alone. Visibility: 2 KM.
Temperature: Dry: +22^{O}C, Dew point: +18^{O}C. Sea: +19.0^{O}C.

Q.2 a) Sketch and describe use and application of Windrose.
b) On Monkey Island of a ship steering course 117^{O}(T) at 16 knots, Anemometer showed reading of 15 knots and handkerchief held up was blowing towards SW by S direction. Find the direction and speed of wind required to be mentioned in weather report.

Q.3) Sketch and describe principle and working of a Marine Barograph. What correction is applied to it. Why barogram have curved lines.

Q.4) Differentiate between the following:
a) Mist and Fog
b) Hoar frost and Rime
c) Sea and Swell
d) Veering and Backing

Q.5) Explain following:
a) The leeward side of Mountain range is warmer and drier than windward side.
b) Classification of clouds as per WMO.

Q.6) Describe formation of:
a) South West Monsoon
b) Katabatic wind and Anabatic wind

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GOVERNMENT OF INDIA

Date: - 11th Mar-2024

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather observation taken on vessel at 1750 IST on 4th January, when vessel was at 50° 12'N, 030° 17'W, Ship ATGV, Wind speed 42 Knots, Height of the base of the Lowest Cloud is 300 Mts. Horizontal Visibility 0.21 nautical miles. The sky is fully covered by clouds. The wind is blowing from 090°, Air temp. +7.5°C, Dew point Temperature +7.2°C, Barometric Pressure is 995.2 hPa. The barometer has fallen steadily in the last three hours decreasing by 2.1 hPa. There is intermittent moderate rain (not freezing) at the time of observation: Vesel experienced drizzle and rain since 1150 Hrs IST, A layer of Nimbostratus cloud covers the sky. The ship course is 270° and the speed 14 knots.

The sea temperature (measured by intake) is +7.0°C. Sea waves are estimated to be 5 mts high, with a period of 10 seconds, the swell waves are coming from 180°, height 4 mts period 16 seconds. The wet bulb temperature is +7.4°.

Q.2 a) A vessel on a course of 090° speed 19 knots. The wind estimated by observing the sea surface was 22 knots. Funnel smoke was blowing towards South. State what entry is to be made in weather report regarding wind direction and speed?

b) Explain with a suitable sketch the "Wind Rose" given in the Admiralty Sailing Directions.

Q.3) Sketch and describe Hygrometer and Stevenson Screen. What precautions are required in its use?

Q.4) Write short notes on:

i} Convection clouds ii) Relative Humidity iii) Barometric Tendency

Q.5) a) What is an air mass and how air masses are classified?

b) What is a front? How fronts are depicted on a weather map?

Q.6) Explain the factors to be considered by ship's officers for weather routing of his ship.

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GOVERNMENT OF INDIA

Paper 2 **Date: - 3rd Jan-2024**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following Ship's report:

Ship's Call Sign: RIMF; Position $00^{O}05'N$, $045^{O}58'W$, course and speed made good past three hours: 170^{O} at 13 knots, UTC time: 20d 06h 30m, Wind NExE, estimated at 20 knots, visibility: 800m, Pressure: 1012.6 mb, Tendency: +3.2mb, Barograph trace: Increasing steadily or unsteadily. Temperature → Dry bulb: $28.5^{O}C$, Wet bulb: $24.4^{O}C$, Sea: $19.6^{O}C$, Clouds: sky overcast with a few blue patches, low cloud 3 OKTAS, base 600m above sea level, Cu of strong vertical extent, Ac in a chaotic sky, Cc present. Present Weather: slight continuous rain, Past weather: continuous drizzle, Sea period: 04 sec, Height: 3m swell from ExS, Period: 08 sec, Height 05m.

Q.2 a) Ship's course SW by W at 12 knots from a true wind was observed to be coming from 2 points abaft starboard beam. The funnel smoke was blowing towards a direction 3 points abaft port beam. Find the speed of true and apparent wind and state what entries are to be made in ship's log book and weather report. (15 Marks)

b) State Buy's Ballots Law and its uses. (05 Marks)

Q.3) Describe the formation of following types of fog: i) Advection Fog ii) Radiation Fog iii) Arctic Sea Smoke and iv) Smog

Q.4) a) Sketch and describe the construction of an Aneroid Barometer.

b) Write the advantages of a barograph.

Q.5) Write short notes on the following:

a) Dew point b) Isallobar c) Katabatic Wind d) Cold Front

Q.6) a) Sketch and describe: i) Cyclone ii) Ridge

b) What is the weather associated with an Anticyclone?

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GOVERNMENT OF INDIA

Paper 1 **Date: - 3rd Jan-2024**

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following:

Ship's Call Sign: ATTK, Posn 14^{O} 31'S 088^{O} 09'W, Date and time of observation: 10th May 1700 IST, Course made good 080^{O}(T) at 15 knots. estimated Wind: NNE 12 knots (estimated), Visibility: 5 Km, Atmospheric pressure: 1002 mb, Barograph trace: falling then steady, change: 1.7mb, Dry bulb: 29.5^{O}C, Wet bulb: 28^{O}C, Sea temp:26^{O}C, Clouds: Nearly overcast, St at 600m above sea level covering 5/8 of sky, Nimbostratus lying above covering most of remaining sky. Present Weather: Thunderstorm with no precipitation, Past weather: Showers and Thunderstorm, Sea: 6 see, height 0.5m, Swell from: 180^{O}(T), height 1m, period 10 sec.

Q.2 a) A vessel estimated wind force 7 (33 knots) by watching sea waves. Her course was 076^{O}(T) speed 17 Knots. Funnel smoke was blowing towards 352^{O}(T). State, what entry is to be made in log book for wind direction and speed?

b) Describe Buy's Ballot's law and its limitations.

Q.3) a) Describe the use of an anemometer. (05 Marks)

b) With a neat sketch of wind rose, discuss the information you will obtain from it. (15 Marks)

Q.4) Write short notes on:

i} Convection clouds ii) Sea breeze

iii) Prognostic charts iv) Squall

Q.5) Describe with a sketch the weather associated with: -

a) Anticyclone b) Col

Q.6) a) Define visibility and how it is estimated at sea? (05 Marks)

b) What will be the effect on visibility when cold dry air blows over relatively warm seawater? (10 Marks)

c) Differentiate between fog and mist. (05 Marks)

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GOVERNMENT OF INDIA

Date: - 15th Nov-2023

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Decode the following weather report?

BBXX ATVH 10123 99408 30492 41398 62828 10143 20082 40084 56028 76364 84364 22234 00175 20808 3022// 41006

Q.2 a) Own Vessel was on SSE'ly course with speed 13 Knots. Anemometer showed a reading of 32 knots. The direction of wind by observing line of waves was from her stbd beam. What entry will you make in deck log and in weather report for wind direction and speed? If OOW threw a piece of paper, in which direction will it fly? (15 marks)

b) What is Geostrophic wind? (05 marks)

Q.3) a) Describe relative humidity and its use?

b) On a given day, following temperature was observed on board: Dry bulb: 30.5^{O}C, Wet bulb: 25^{O}C, Cargo Hold: 18^{O}C. Considering above, how will you plan your hold ventilation?

Q.4) How is South West monsoon formed in the North Indian Ocean?

Q.5) a) Define Isobars. (05 Marks)

b) With a suitable sketch, describe any three Isobaric Patterns and weather associated with them. (15 Marks)

Q.6) Differentiate between following:

a) Mist and Fog b) DALR and SALR c) Drizzle and Rain d) Land and Sea breeze

**********X***X**********

GOVERNMENT OF INDIA

Date: - 11th Sept-2023

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following weather report using Ship's Weather Code 1982:

Call sign "BVV45" in position 03^{O} 12'S 015^{O} 11'W at 1355 UTC on 16th September steered a course of 100^{O} at 14 knots. Estimated wind: south westerly at 12 knots Barometric pressure: 998mb, barometric trace decreasing and then increasing, no change in last three hours. Visibility 17 km. Temperature: Dry 32.5^{O}C Wet 29.5^{O}C. Total Clouds ¾ of the sky. Low clouds: Sc ½ of the sky 200 m above sea level, Ac in chaotic sky. Ci in the form of filaments as hooks. Present and past weather were not of significance.

Q.2 a) A vessel on a course of 320^{O}(T) speed 15 knots. The anemometer and wind vane showed 20 knots and 045^{O}(T) respectively. State what entry is to be made in weather report regarding wind direction and speed? In which direction the funnel smoke will be blowing?

b) Explain Pressure Gradient Force and Coriolis Effect.

Q.3) Sketch and describe Whirling Psychrometer. What precautions are required in its use?

Q.4) a) Explain the difference between:

i) Sea and swell, and

ii) Mist and Fog

b) Describe the information contained in the coastal weather bulletin.

Q.5) a) Explain with a suitable sketch "Trade Winds" and the reason for these winds on the planetary scale.

b) What is the cause of South West Monsoon in Indian Sub-continent?

Q.6) Explain the following:

a) Storm surge.

b) Significant wave height

c) Bore tide

d) Dew Point temperature

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GOVERNMENT OF INDIA

Date: - 10th July-2023

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Using the Ship Weather Code, 1982, please code the following weather observations:

Call Sign: ATVQ, Position: 06^{O} 18'S, 015^{O} 13'W. On 16th May GMT 20h, 20m, while on a course of 121 degrees true, at a speed of 12 knots, the barometric pressure was 998mb, Barometric tendency 4mb, Barograph trace steadily falling, visibility 16Km, Temperature dry= 32.5^{O}C, Wet = 29.5^{O}C, Sea Water temperature: 28 degrees C, Clouds: 6/8 of the sky, True wind from north, at 16 knots, Low clouds Se 4/8 of the sky, Ac in Chaotic Sky Ci in the form of Filaments as hooks. Present weather, continuous heavy rain, with occasional thunder, and past weather overcast, with the heavy low-lying clouds throughout. Sea state, waves 3 meters, period 12 seconds, swell from 240^{O}(T), height 4 meters, period 15 seconds.

Q.2 a) On a course of 045^{O}(T), at 16 knots find the apparent wind direction and speed if a true easterly wind of 14 knots was blowing. (15 Marks)

b) Explain what is TRUE WIND and APPARENT WIND? (05 Marks)

Q.3) a) What is HYDROLOGICAL CYCLE?

b) Explain dew, hoarfrost & rime.

Q.4) a) Describe "CORIOLIS FORCE" and explain why it takes place?

b) With a neat sketch explain FOHN WIND EFFECT.

Q.5) a) Describe the use of whirling psychrometer.

b) What is CARGO SWEAT and SHIP'S SWEAT?

Q.6) a) Explain the weather associated with TRS.

b) Explain the dangerous semi-circle and navigable semi-circle of TRS in 'Northern' hemisphere?

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GOVERNMENT OF INDIA

Date: - 9th May-2023

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Using the Ship Weather Code, 1982, please code the following weather observations:

Code the following weather report, using the Ship's Weather Code 1982.

Call Sign: ATVQ, Position: 03^{O} 15'S, 015^{O} 13'W steered a course of 090^{O}(T) at 16 knots during last 3 hours. Estimated wind South-Westerly at 10 knots.

On 16th May GMT 13h, 40m, the barometric pressure was 998 mb, Barometric tendency 4 mb, Barograph trace steadily falling, visibility 16km. Temperature dry=32.5^{O}C, Wet=29.5^{O}C, Clouds: 6/8 of the sky. Low clouds Sc 4/8 of the sky; Ac in Chaotic Sky Ci in the form of Filaments as hooks. Present and past weather were not of significance.

Q.2 a) Differentiate between Gust & Squall (05 Marks)

b) On a course of 045^{O} speed 15 knots. Apparent wind 100^{O} at 20 knots. Find the direction speed of true wind. (15 Marks)

Q.3) a) Short notes on Trough and Ridge. (05 Marks)

b) Describe the information received through facsimile weather receiver. (15 Marks)

Q.4) Describe the following: i) Advection Fog ii) Radiation Fog iii) Arctic Sea Smoke iv) Smog

Q.5) Sketch and describe aneroid barometer.

Q.6) Explain the following ISOBARIC patterns and the weather associated with them.

a) Col

b) Cyclone

c) Anticyclone

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GOVERNMENT OF INDIA

Date: - 9th Mar-2023

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory. Attempt any four out of remaining five Questions.
2. All Questions carry equal marks. i.e. 20 marks each
3. Use ships weather code 1982.

Q.1 Code the following report:

Call sign ATVH, Position 09 38'N, 068 41'E, Course and Speed made good in last three hours 355 (T) at 18 knots. UTC time 23 D 09H 28M, Wind S by W, estimated 22 knots, Visibility 1900 mtrs, Pressure 1006.8 mb, tendency (-) 2.8 mb, Barograph Trace – decreasing then steady, Temp dry bulb 30 C, wet bulb 22 C, Sea Temp 14 C. Clouds: Sky nearly overcast, low clouds 5 oktas, base 300 mtrs above sea level cumulonimbus forming an anvil. Ac resulting from cumulus, Cirrocumulus alone. Present weather Slight Drizzle, not freezing intermittent, Past Weather continuous drizzle, Sea period 05 sec, height 4 mtrs, swell from NW, period 06 sec height 4.2 mtrs.

Q.2 a) A vessel on a course of 310^{O}(T), speed 20 knots, observes the direction of wind by looking at the line of waves as NE. The anemometer at that time showed a speed of 28 knots. State the direction in which the funnel smoke will blow. State what direction and speed of wind is to be entered in the log book. (15 marks)

b) Describe Coriolis force. (5 marks)

Q.3) Draw a neat Sketch and explain functioning of Aneroid Barometer. What precautions are required to be taken in the care and maintenance of Barograph.

Q.4) Write notes on: a) SALR b) Troposphere and Tropopause c) Relative Humidity
d) Barometric tendency e) Isallobars

Q.5) a) Explain with neat sketch how the following clouds are formed by
i) Convection ii) Orographic lifting (10 marks)

b) Explain how Advection fog forms and give examples of areas where you may encounter the same at sea. (10 marks)

Q.6) a) Explain NE Monsoons with a neat sketch. (10 Marks)

b) Explain what are Cold Front and Warm Front, draw the symbols used on weather map for each? What is the weather experienced on passage of a Cold Front? (10 Marks)

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GOVERNMENT OF INDIA

Date: - 7th Nov-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory.
2. Attempt any four out of remaining five Questions.
3. All Questions carry equal marks.
4. Use ships weather code 1982.

Q.1 Code the following weather report using Ship's Weather Code 1982:

Call Sign: VQQG, Position: 00^{O} 01'N 179^{O} 55'E, Course made good: 179^{O}T, Speed: 14.5 knots, Time: 12d 18h 30m GMT, Wind 048^{O}T estimated 12 kts, Visibility: 1km, Pressure: 1003.5mb, Barometric Tendency: +2.3 mb. Trace shows pressure increasing steadily at first and then steady.

Temperature: Dry 32.0^{O}C, Wet 27.5^{O}C, Sea 19.5^{O}C.

Clouds covering $5/8^{th}$ of the sky. Low clouds 3 oktas with base 500 meters above sea. Cu of strong vertical extent. Ac in chaotic sky. Cc also present.

Present weather: Thick haze, thunderstorms.

Sea: Period 08 seconds, Height 0.5 meters

Swell: Direction 170^{O}T, Period 10 seconds, Height 2.0 meters.

Q.2 a) A vessel steering 060^{O} (T) at 15 kts, experiencing apparent wind @ 14 kts coming from 30^{O} on port bow. Find the direction and speed of true wind.

b) What are the various means of finding out true wind direction at sea?

Q.3) What is Barometric Tendency? Sketch & describe a Barograph.

Q.4) a) Explain Fohn wind effect.

b) Why is the diurnal range of atmospheric temperature over land is higher than that over sea/ ocean?

Q.5) Explain the following:

a) The lee side of a mountain range is drier than the windward side

b) Polar Regions are cooler than equatorial regions

Q.6) a) What is a frontal Depression?

b) What are weather Analysis & Weather Prognosis Charts?

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GOVERNMENT OF INDIA

Date: - 13th Oct-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Decode the following Weather report:

BBXX	ATUX	14183	99234	70205	41498
63034	10186	20152	49998	52012	75085
86602	22264	00170	21206	330//	41208

Q.2 a) Write short notes on Through and Ridge.

b) On a course of north at 11 knots, find the apparent wind direction and speed if a true easterly wind of 14 kts was blowing.

Q.3) With the help of a simple sketch explain the operating principle, use, working, errors, care and maintenance of Anemometer.

Q.4) Write short notes on:

a) Classification of clouds

b) Adiabatic Change of Temperature

c) Occluded front

Q.5) Explain as to how different type of fog can form.

Q.6) Explain the following: -

a) Sea and swell

b) Tsunami

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GOVERNMENT OF INDIA

Date: - 13th Sept-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Using the Ship Weather Code, 1982, please code the following weather observations:

Call Sign: ATVQ, Position: 06^{O} 18' S, 015^{O} 13' W. On 16th May GMT 20h, 20m, while on a course of 121 degrees true, at a speed of 12 knots, the barometric pressure was 998 mb. Barometric tendency 4 mb, Barograph trace steadily falling, visibility 16 Km. Temperature dry = 32.5^{O}C, Wet = 29.5^{O}C, Sea water temperature: 28 degrees C, Clouds: 6/8 of the sky. True wind from north, at 16 knots. Low clouds Sc, 4/8 of the sky; Ac in Chaotic Sky Ci in the form of Filaments as hooks. Present weather, continuous heavy rain, with occasional thunder and past weather overcast, with think heavy low-lying clouds throughout. Sea state, waves 3 meters, period 12 seconds, swell from 240^{O}(T), height 4 meters, period 15 seconds.

Q.2 a) For a vessel on NE'ly course and speed of 25 Knots, an anemometer showed wind direction N by E and speed 20 knots. Find what entry is to be made in deck log book regarding wind direction and speed?

b) Explain with a sketch the pressure gradient force and its importance.

Q.3) Sketch and describe the principle and working of an aneroid barometer. Discuss advantages of its use over a mercury barometer.

Q.4) List the seven isobaric patterns. Explain briefly any three of them with appropriate sketch.

Q.5) Compare and contrast the weather associated with cold and warm front. Explain with sketches.

Q.6) a) Discuss the various ways in which the atmosphere gains heat.

b) Explain Green House effect.

**********X***X**********

GOVERNMENT OF INDIA

Date: - 12th Aug-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Decode the following weather report:

BBXX	VHAN	16003	99000	10469	41593
70510	10285	20208	40088	53036	70694
84299	22242	00206	20401	327//	40808

Q.2 a) A vessel steering a course of 160^{O} (T) at a speed 12 Knots, found wind speed of 10 kts from anemometer & funnel smoke was blowing towards 025^{O} (T). Find what entry is needed in Log book.
b) What is Buys Ballot's Law?

Q.3) Draw a neat Sketch of a Barograph & label its parts.

Q.4) a) What is the difference between Isobars and Isallobars?
b) What is barometric tendency? Explain how it can be used to predict movement of pressure systems?

Q.5) a) Write the difference between Mist & Fog.
b) Describe various types of Fog and their formations.

Q.6) a) Explain Sea breeze.
b) Explain formation of orographic clouds.

**********X***X**********

GOVERNMENT OF INDIA

Date: - 8th July-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather observations taken on a vessel at 1750 IST on 4th January, when the vessel was at 50^{O} 12'N 030^{O} 17'W. Ship ATGV wind speed estimated at 42 knots.
Height of the base of the lowest cloud is 300 meters.
Horizontal visibility is 0.21 nautical miles.
The sky is fully covered by clouds
The wind is blowing from 090^{O}(T)
Air temperature is +7.5^{O}C, Dew point temperature is +7.2^{O}C.
Barometric pressure is 995.2 hpa. The barometer has fallen steadily in the last 3 hour decreasing by 2.1 hpa.
There is intermittent moderate rain (not freezing) at the time of observation, vessel experienced drizzle and rain since 1150 IST.
A layer of nimbostratus clouds covers the sky.
The ship's course is 270^{O} and speed 14 knots.
The sea temperature (measured by intake) is +7.0^{O}C.
Sea waves are estimated to be 5m high, with a period of 10 seconds, the swell waves are coming from 180^{O}(T), height 4m, period 16 seconds.
The wet bulb temperature is + 7.4^{O}C.

Q.2 a) Vessel's course was 275 deg T and speed 14.0 knots. The wind indicated by the Anemometer was 60 deg to Starboard and the speed indicated by Anemometer was 7.0 knots. State what entry you will make in the Deck Log Book regarding True Wind?
b) State the caution to be exercised whilst applying Buy's Ballot's Law.

Q.3) Describe the Working of a Barograph with a neat sketch. Explain the care and Weekly routine on its maintenance.

Q.4) Write short notes on the following:
i) Advection Fog ii) Cyclone iii) CO
iv) Trough v) Barometric Tendency.

Q.5) a) What is semi-diurnal variation of Atmospheric Temperature? Why is the Semi-diurnal Range over land is large compared to sea?
b) What is Relative Humidity and Dew point Temperature?

Q.6) Describe FOHN Wind effect with sketch and example.

**********X***X**********

GOVERNMENT OF INDIA

Date: - 7th June-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Decode the following using ships weather code 1982:

BBXX	ATJQ	13063	99182	10823	41597
41228	10325	20280	40084	53031	79112
84149	22274	00315	20604	30406	41006

Q.2 a) A vessel was steering a westerly course at 15 knots. The wind direction and speed displayed by anemometer was 060^{O}(R) on port bow at 10 knots. What entry for true wind is to be made in ships logbook, and weather message respectively.

Q.3 Draw a neat sketch and explain the functioning of barograph. What precautions are required to be taken in its care, maintenance and its use?

Q.4 Explain the followings:-

a) Buys Ballot's law

b) Geostrophic wind scale.

Q.5 What type of cloud is likely to form when atmosphere is 'unstable'? State the features of this cloud type and list the likely weather conditions in the vicinity of and under such a cloud.

Q.6 a) Describe with sketches the process of frontogenesis.

b) Write short notes on various weather bulletins issued bv Meteorological Department for the benefit of mariners.

**********X***X**********

GOVERNMENT OF INDIA

Date: - 10th May-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following ship's full reports, using the ship's Weather Code 1982:

Date and GMT	: 4 May, 1800 GMT
Ship's Call Sign	: ATVH
Ship's Position	: 52^{O} 42'N, 020^{O} 30'W
Ship's Course / speed	: 180^{O}T/ 15 knots
Wind	: 080^{O}T, speed 9 knots estimated
Weather	: Cloudless, No significant phenomenon
Visibility	: 8.8 nautical miles
Barometric pressure	: 1020.3 mb
Barometric tendency	: Increasing then increasing slowly. Changed 0.4 mb in last 3 hrs.
Air temperature	: + 14.3^{O}C.
Dew point temp	: + 6.8^{O}C
Sea temperature	: + 13.0^{O}C
Sea waves	: Period 4 seconds, Height 0.8 meter
Swell	: Dir. 130^{O}T : Period 6 sec : Height 1.5 meters

Q.2 a) A vessel is steering a course 080^{O}(T) at a speed of 12 knots. Direction of wind as obtained by observing line of sea waves was 'Westerly' but apparent wind direction was 'N'. State what direction and wind speed is to be entered in the log book? Towards which direction will the funnel smoke fly?

b) Explain Coriolis force, how it affects the winds in both Hemisphere.

Q.3 Sketch and describe the working principle of precision Barometer. Explain the errors to be applied on reading obtained from the precision Barometer. (20 Marks)

Q.4 Explain following:

a) Type and formation of fog occurring at Dover strait (English Channel) and Grand Bank of New Found land. (10 Marks)

b) How will you predict fog at sea? (10 Marks)

Q.5 List the different type of fog. What are the effects of fog? Explain why there is persistent fog off the Grand Banks of Newfoundland. (20 Marks)

Q.6 a) Describe various types of information received by facsimile Weather receiver. (10 Marks)

b) Describe the difference between frontogenesis and frontolyes. (10 Marks)

**********x***x**********

GOVERNMENT OF INDIA

Date: - 07th April-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following in a suitable format for transmission: -

A ship: MV Imagine, call sign:-
LGMW, position 01^O 25'N, 178^O 05'E, UTC time 0910, UTC date – 17 June,
SMT 2110, Course made good in last 3 hours 165^O, speed: 17 kts, estimated wind: 136^O at 14, visibility 16 KM, atmospheric pressure: 987.6 hpa, barometric tendency: +2.5 hpa, increasing steadily. Temp: dry 28.0^OC, wet: 23.0^OC, sea:22^OC, clouds: - fully covered with clouds except for few blue patches, low cloud cover: 4 oktas, base 1000 M above sea, Cu of little vertical extent and seemingly flattened, Ac of chaotic sky, Cc alone. Present wx: State of sky on the whole unchanged, past wx: - cloud covering more than ½ of the sky throughout the appropriate period, rain. Sea period 07 sec, height: 03 mtrs, Swell coming from east period 7 sec, height: 03 mtrs.

Q.2 a) Vessel's course 275^OT, speed 14 kts, the wind direction and speed displayed by the anemometer was Stbd 060^O and 7 kts. What entry for true wind is to be made in the logbook?
b) Explain what is pressure gradient force and Coriolis force.

Q.3 Describe construction, working and errors of Aneroid Barometer.

Q.4 a) List different types of fog.
b) Explain why there is persistent fog off the Grand Banks of New foundland.

Q.5 a) Define Fog & Mist & explain how it is formed.
b) Explain Land & Sea Breeze.

Q.6 Sketch and describe the lifecycle of a frontal depression. What kind of weather will be encountered during passage of cold front?

**********X***X**********

GOVERNMENT OF INDIA

Date: - 08th March-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following ship's full reports, using the ship's Weather Code 1982.

Date and GMT	: 4 May, 1800 GMT
Ship's Call Sign	: ATVH
Ship's Position	: 52^{O} 42'N, 020^{O} 30'W
Ship's Course / Speed	: 180^{O}T / 15 Knots
Wind	: 080^{O}T speed 9 knots estimated.
Weather	: Cloudless. No significant phenomenon
Visibility	: 8.8 nautical miles
Barometric pressure	: 1020.3 mb
Barometric tendency	: Increasing then increasing slowly. Changed 0.4 mb in last 3 hrs.
Air temperature	: + 14.3^{O}C
Dew point temp	: + 6.8^{O}C
Sea temperature	: + 13.0^{O}C
Sea waves	: Period 4 seconds: Height 0.8 meter
Swell	: Dir. 130^{O}T: Period 6 sec: Height 1.5 meters.

Q.2 a) Course 295^{O} speed 16 knots out in open sea. Wind force 4 (18 knots) estimated by appearance of the sea surface. Smoke from the funnel was observed to be blowing to NNE. What entry is to be made in the weather report with respect to wind direction and speed? (15)

b) What is Coriolis force? How does it affect the wind blowing over sea and land? (5)

Q.3 With the help of a neat sketch describe the functioning of an Aneroid barometer, what are the errors possible? List precautions to be taken while using the same?

Q.4 Describe in detail seven basic isobaric patterns with the help of suitable sketches.

Q.5 Explain the "Formation of clouds" due to following:

a) Turbulence b) Convection

Q.6 Enumerate the weather associated with warm front, cold front and occluded front. Draw the symbols used in weather charts to depict these fronts.

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GOVERNMENT OF INDIA

Date: - 07th February-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following ship's full reports, using the ship's Weather Code 1982.

Date and GMT	: 4 May, 1800 GMT
Ship's Call Sign	: ATVH
Ship's Position	: 52^{O} 42'N, 020^{O} 30'W
Ship's Course / Speed	: 180^{O}T / 15 Knots
Wind	: 080^{O}T speed 9 knots estimated.
Weather	: Cloudless. No significant phenomenon
Visibility	: 8.8 nautical miles
Barometric pressure	: 1020.3 mb
Barometric tendency	: Increasing then increasing slowly. Changed 0.4 mb in last 3 hrs.
Air temperature	: + 14.3^{O}C
Dew point temp	: + 6.8^{O}C
Sea temperature	: + 13.0^{O}C
Sea waves	: Period 4 seconds: Height 0.8 meter
Swell	: Dir. 130^{O}T: Period 6 sec: Height 1.5 meters.

Q.2 a) Course 295^{O} speed 16 knots out in open sea. Wind force 4 (18 knots) estimated by appearance of the sea surface. Smoke from the funnel was observed to be blowing to NNE. What entry is to be made in the weather report with respect to wind direction and speed? (15)
b) What is Coriolis force? How does it affect the wind blowing over sea and land? (5)

Q.3 With the help of a neat sketch describe the functioning of an Aneroid barometer, what are the errors possible? List precautions to be taken while using the same?

Q.4 Describe in detail seven basic isobaric patterns with the help of suitable sketches.

Q.5 Explain the "Formation of clouds" due to following:
a) Turbulence b) Convection

Q.6 Enumerate the weather associated with warm front, cold front and occluded front. Draw the symbols used in weather charts to depict these fronts.

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GOVERNMENT OF INDIA

Date: - 07th January-2022

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather report:
Ship's Name: SS Loyalty, Call Sign: LGMW, Posn 01^{O} 25'S 178 ^{O} 05'E. Date: 17 June, SMT: 2110, CMG & SMG IN Last 3 hrs : 165 (T), 17 kn. Estimated Wind:136 (T), 14 kts, Visibility: 16 Km, Atmospheric pressure: 987.6 hpa, Barometric Tendency: +2.5 hpa increasing steadily.
Temperature: dry: +28^{O}C, Wet: +23^{O}C, Sea: +22^{O}C.
Cloud: Fully covered sky with few blue patches, low clouds cover 4 oktas, base 1000 meters, above sea, Cu with little vertical extent and seemingly flattened, Ac in a chaotic sky, Cc alone.
Present Wx: State of Sky on the whole unchanged.
Past Wx: Cloud covering more than ½ of sky throughout period, rain.
Sea period: 07 sec, height 1.5 mtrs, Swell coming from south east, period 7 sec, height 3 mtrs.

Q.2 A vessel steaming due east at 19 knots in open sea, observes the sea surface and estimates the wind force to be lower limit of force 6 (22 knots). A handkerchief held up was observed to blow towards south. State what entry is to be made in the weather report regarding wind direction and speed?

Q.3 Describe basic principle and working of Aneroid barometer. What are the correction to be applied to its reading before making entry in deck log book? Why Aneroid barometer is preferred over mercury barometer for use on board the ship?

Q.4 Explain the following:
a) Type and formation of fog occurring at Dover strait (English Channel) and Grand Bank of New Found land.
b) How will you predict fog at sea?

Q.5 Describe with sketch formation of:
a) NE Monsoon b) Land and Sea breeze

Q.6 Describe with sketch the process of frontogenesis. What type of weather is associated with cold front and warm front?

**********X***X**********

GOVERNMENT OF INDIA

Date: - 07th December-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Q. Code the following ship's full reports. Using the ship's Weather code 1982.

Date and GMT	: 4 May, 1800 GMT
Ship's Call Sign	: ATVH
Ship's Position	: 52^{O} 42'N, 020^{O} 30'W
Ship's Course speed	: 180^{O}T / 15 knots
Wind	: 080^{O}T, speed 9 knots estimated.
Weather	: Cloudless. No significant phenomenon.
Visibility	: 8.8 nautical miles
Barometric pressure	: 1020.3mb
Barometric tendency	: Increasing then increasing slowly. Changed 0.4mb in last 3 hrs.
Air temperature	: +14.3^{O}C.
Dew point temp	: +6.8^{O}C.
Sea temperature	: +13.0^{O}C.
Sea Waves	: Period 4 seconds: Height 0.8 meter
Swell	: Dir. 130^{O}T: Period 6 sec: Height 1.5 meters.

Q.2 a) A vessel is steering a course 080^{O}(T) at a speed of 12 knots. Direction of wind as obtained by observing line of sea waves was 'Westerly' but apparent wind direction was 'N'. State what direction and wind speed is to be entered in the log book? Towards which direction will the funnel smoke fly?

b) Explain Coriolis force, how it affects the winds in both Hemisphere.

Q.3 Describe Basic principle and working of Aneroid barometer. What are the correction to be applied to its reading before making entry in deck log book? Why Aneroid barometer is preferred over mercury barometer for use on board the ship?

Q.4 Explain the following:
a) Type and formation of fog occurring at Dover strait (English Channel) and Grand Bank of New Found land.
b) How will you predict fog at sea?

Q.5 a) Describe with sketch Katabatic and Anabatic wind.
b) Describe with sketch S W Monsoon.

Q.6 a) Describe the classification and properties of air masses.
b) What are the factors affecting the properties of an air mass?

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GOVERNMENT OF INDIA

Date: - 09th November-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather observations taken on a vessel at 1750 IST on 4th January, when the vessel was at 50^{O} 12'N, 030^{O} 17'W.
Ship: ATGV, wind speed estimated at 42 knots.
Height of the base of the lowest cloud is 300 meters.
Horizontal visibility is 0.21 nautical miles.
The sky is fully covered by clouds.
The wind is blowing from 090^{O}(T)
Air temperature is $+7.5^{O}$C, Dew point temperature is $+7.2^{O}$C.
Barometric pressure is 995.2 hpa. The barometer has fallen steadily in the last 3 hour decreasing by 2.1 hpa
There is intermittent moderate rain (not freezing) at the time of observation, vessel experienced drizzle and rain since 1150 IST.
A Layer of nimbostratus clouds covers the sky. The ship's course is 270^{O} and speed 14 knots.
The sea temperature (measured by intake) is $+7.0^{O}$C.
Sea waves are estimated to be 5m high, with a period of 10 seconds, the swell waves are coming from 180^{O}(T), height 4m period 16 seconds. The wet bulb temperature is $+7.4^{O}$C.

Q.2 a) On a course of 154^{O} at 13 knots an anemometer on the bridge showed a wind speed of 32 knots. The direction of wind by observing line of waves was WSW. What entry is to be made in the weather report with respect to wind direction and speed? If an observer on the vessel threw up a piece of paper in which direction would it fly off? (15)
b) State Buy Ballot's Law. Explain the precautions to be observed when applying Buy Ballot's Law. (5)

Q.3 Sketch and describe the whirling Psychrometer. What are the advantages of the whirling psychrometer over the hygrometer?

Q.4 What are isobars and how are they used to predict weather? With suitable sketches describe any THREE isobaric patterns and the weather associated with them.

Q.5 Write short notes on the following:
i) DALR ii) Sea iii) ITCZ iv) Warm Front.

Q.6 a) Describe the classification and properties of air masses.
b) What are the factors affecting the properties of an air mass?

**********X***X**********

GOVERNMENT OF INDIA

Date: - 07th October-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following ship's full reports, using the ship's Weather Code 1982:

Date and GMT	: 4 May, 1800 GMT
Ship's Call Sign	: ATVH
Ship's Position	: 52^{O}42'N, 020^{O}30'W
Ship's Course / speed	: 180^{O}T / 15 knots.
Wind	: 080^{O}T, speed 9 knots estimated
Weather	: Cloudless. No significant phenomenon
Visibility	: 8.8 nautical miles
Barometric pressure	: 1020.3 mb
Barometric tendency	: Increasing then increasing slowly, changed 0.4 mb in last 3 hrs.
Air temperature	: + 14.3^{O}C
Dew point temp	: + 6.8^{O}C
Sea temperature	: + 13.0^{O}C
Sea waves	: Period 4 seconds : Height 0.8 meter
Swell	: Dir 130^{O}T : Period 6 sec: Height 1.5 meters

Q.2 a) Vessel's course 170^{O}T, speed 15kts, the wind direction and speed displayed by the anemometer was port 045^{O} and 12 kts. What entry for the true wind is to be made in the ship's logbook? (15 Marks)
b) Describe the ideal pressure and wind distribution on earth's surface assuming earth fully covered by water. (05 Marks)

Q.3 Sketch and describe the working principle of precision Barometer. Explain the errors to be applied on reading obtained from the precision Barometer. (20 Marks)

Q.4 Define Isobar and how they used to predict weather. With suitable sketch, describe any three Isobaric patterns and weather associated with them.

Q.5 List the different type of fog. What are the effects of fog? Explain why there is persistent fog off the Grand Banks of Newfoundland. (20 Marks)

Q.6 Explain the following in details:
a) Advantages of shore based weather Routeings. (10 Marks)
b) Why the lower latitudes areas are warmer than higher latitude areas. (10 Marks)

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GOVERNMENT OF INDIA

Date: - 07th September-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Encode the following Weather report from a ship station:
Ship: AWKG, Position: 06^{O} 12.5'S, 084^{O} 43'E, course made good over last three hours: 120^{O} at 13 knots, GMT: 23d 00h 20m, Wind: Northerly estimated at 11 knots, Visibility: 700 Mtrs. Pressure: 1011 hpa, Tendency: +3.6 hpa, Barograph trace: Increasing then decreasing. Temperature: Dry 23.5^{O}C, Wet 21.0^{O}C, Sea base 800 mtrs above sea level, Cu of moderate or strong vertical extent, Ac in a Chaotic sky, Cc.
Present Weather: Visibility poor due to dust in suspension in the air, not raised by wind at or near ship. Past Weather: drizzle rain.
Sea: Period 08 seconds, height 2.0 mtrs. Swell: From 220^{O}, Period 10 seconds, height 5.0 mtrs.

Q.2 a) A vessel is steering a course 080^{O}(T) at a speed of 12 knots. Direction of wind as obtained by observing line of sea waves was 'Westerly' but apparent wind direction was 'N'. State what direction and wind speed is to be entered in the log book? Towards which direction will the funnel smoke fly?
b) Explain Coriolis force, how it affects the winds in both Hemisphere.

Q.3 Describe Basic principle and working of Aneroid barometer. What are the corrections to be applied to its reading before making entry in deck log book? Why Aneroid barometer is preferred over mercury barometer for use on board the ship?

Q.4 Explain the following:
a) Type and formation of fog occurring at Dover strait (English Channel) and Grand Bank of New Found land.
b) How will you predict fog at sea?

Q.5 Explain with the help of neat sketches the formation and classification of different types of clouds as per height.

Q.6 a) Describe the classification of properties of air masses.
b) What are the factors affecting the properties of an air mass.

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GOVERNMENT OF INDIA

Date: - 08th August-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather report:

Ship's Name: SS Loyalty, Call Sign: LGMW, Posn 01^{O} 25'S 178^{O} 05'E. Date: 17 June, SMT: 2110, CMG & SMG IN Last 3 hrs : 165 (T), 17 kn. Estimated Wind:136 (T), 14 kts, Visibility: 16 Km, Atmospheric pressure: 987.6 bpa, Barometric Tendency: +2.5 hpa increasing steadily.

Temperature: dry: +28^{O}C, Wet: +23^{O}C, Sea: +22^{O}C.

Cloud: Fully covered sky with few blue patches, low clouds cover 4 oktas, base 1000 meters, above sea, Cu with little vertical extent and seemingly flattened, Ac in a chaotic sky, Cc alone.

Present Wx: State of Sky on the whole unchanged.

Past Wx: Cloud covering more than ½ of sky throughout period, rain.

Sea period: 07 sec, height 1.5 mtrs, Swell coming from south east, period 7 sec, height 3 mtrs.

Q.2 a) Own vessel was on course NE by E proceeding at 114 Knots. By observing sea waves wind speed was estimated to be Force 5 (18 kts) and funnel smoke was blowing towards WNW. State what entry to be made in log book regarding wind direction and speed. (15)

b) Describe Buys Ballot's Law and its limitations. (5)

Q.3 Sketch and describe the principle and working of Wind vane and Anemometer. List its error, care and maintenance for same.

Q.4 Define Isobar and how are they used to predict weather. With suitable sketch, describe any three Isobaric patterns and weather associated with them.

Q.5 a) Describe with Sketch Katabatic and Anabatic Wind. (10)

b) Describe with Sketch SW Monsoon. (10)

Q.6 a) Describe various types of information received by facsimile Weather receiver. (10)

b) Describe the difference between frontogenesis and frontolyes. (10)

**********X***X**********

GOVERNMENT OF INDIA

Date: - 15th July-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather observed taken on vessel at 1750 IST on 4th January, when vessel was at 50° 12'N, 030° 17'W, Ship ATGV, Wind speed 42 Knots.
Height of the base of the Lowest Cloud is 300 Mts.
Horizontal Visibility 0.21 nautical miles. The sky is fully covered by clouds.
The wind is blowing from 090°, Air temp. +7.5°C, Dew point Temperature +7.2°C.
Barometric Pressure is 995.2 hPa. The barometer has fallen steadily in the last three hours deceasing by 2.1 hPa. There is intermittent moderate rain (not freezing) at the time of observation: Vessel experienced drizzle and rain since 1150 Hrs IST. A layer of Nimbostratus cloud covers the sky. The ship course is 270° and the speed 14 Knots. The sea temperature (measured by intake) is +7.0°C. Sea waves are estimated to be 5 mts high, with a period of 10 seconds, the swell waves are coming from 180°, height 4 mts period 16 seconds. The wet bulb temperature is +7.4°.

Q.2 a) Draw a neat sketch illustrating Fohn Wind Effect.
b) Ship course SW by W at 12 kts. True Wind observed to be 2 points abaft the starboard beam. The funnel smoke was blowing in a direction 3 points abaft port beam. Find the speed of the true and apparent wind and state what entries will be made in ship's log book and weather report.

Q.3 Describe Basic principle and working of Aneroid barometer. What are the correction to be applied to its reading before making entry in deck log book? Why Aneroid barometer is preferred over mercury barometer for use on board the ship?

Q.4 Write short notes on the following (Any four)
i) Anabatic wind ii) Fohn Wind iii) Relative and Absolute Humidity
iv) Isobars and Isallobars v) High Latitude depression.

Q.5 a) Explain what you understand by cold front, warm front and occluded front and how these fronts are formed.
b) Discuss weather that are associated with each of the above kind of fronts.
c) Give necessary diagram.

Q.6 a) Explain how advection fog is formed. Give some example of the region where advection fog forms.
b) Difference between Synoptic and Prognostic Charts?

**********X***X**********

GOVERNMENT OF INDIA

Date: - 12th April-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following Ship's Weather Observation:

Ship: VHAN, Position: 00^{O} 05'N 46^{O}58'E,
Course made good past 3 hours 170^{O} at 10 Knots,
GMT 16d 00h 20m, Wind 052^{O} estimated at 10 knots.
Visibility 500 mts, Pressure 1008.8 mbs, Tendency +3.6 mbs, Baro, Trace./
Temperature: Dry 28.5^{O}C, Wet 23.0^{O}C, Sea 20.6^{O}C
Cloud: Sky Over Cast with few blue Patches. Low clouds 4 oktas, base 600 metres, above Sea,
Cu of strong vertical extent, Ac in a chaotic sky, Cc.
Present Weather: Visibility Poor due to dust in suspension in the air, not raised by wind at or near ship. Past Weather Thick Haze, thunderstorm.
Sea: Period 04 Seconds, height 0.4 metres. Swell: From 270^{O} period 08 Second, height 0.4 metres.

Q.2 Draw a neat Sketch of "Precision Aneroid Barometer" & enumerate the corrections applicable.

Q.3 a) On a vessel steering 115^{O} at 16 kts, in open sea. Anemometer / Wind vane showed wind coming from 45^{O} on starboard bow with speed of 9 m/s. State the entry you will make in the deck log regarding wind and also state the direction in which the funnel smoke will fly.
b) Explain Foha Wind with a neat sketch.

Q.4 What do you mean by the term "Air-Masses"? Explain Cold front and warm front in terms of movement of cold / warm air masses. Sketch and describe the life cycle of a frontal depression. What kind of weather will be encountered during passage of Cold front?

Q.5 a) How clouds are formed? Discuss about various types of Low clouds.
b) Discuss formation of clouds by Turbulence and convection.

Q.6 Write short notes:
a) Geostrophic Wind and Geostrophic Wind Scale
b) Anticyclone c) Radiation Fog d) Katabatic Winds e) Doldrums

**********X***X**********

GOVERNMENT OF INDIA

Date: - 8th March-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather observations taken on a vessel at 1750 IST on 4th January, when the vessel was at $50^{O}12'N$ 030^{O} 17'W:

Ship: ATGV, wind speed estimated at 42 knots
Height of the base of the lowest cloud is 300 meters
Horizontal visibility is 0.21 nautical miles
The sky is fully covered by clouds
The wind is blowing from 090^{O}(T)
Air temperature is $+7.5^{O}$C, Dew point temperature is $+7.2^{O}$C.

Barometric pressure is 995.2 hpa. The barometer has fallen steadily in the last 3 hour deceasing by 2.1 hpa.
There is intermittent moderate rain (not freezing) at the time of observation, vessel experienced drizzle and rain since 1150 IST.
A layer of nimbostratus clouds covers the sky.
The ship's course is 270^{O} and speed 14 knots.
The sea temperature (measured by intake) is $+7.0^{O}$C.
Sea waves are estimated to be 5m high, with a period of 10 seconds, the swell waves are coming from 180^{O}(T), height 4m, period 16 seconds.
The wet bulb temperature is $+7.4^{O}$C.

Q.2 a) On a course of 154^{O} at 13 knots, an anemometer on the bridge showed a wind speed of 32 knots. The direction of wind by observing line of waves was WSW. What entry is to be made in the weather report with respect to wind direction and speed? If an observer on the vessel threw up a piece of paper, in which direction would it fly off?
b) State Buy Ballot's Law. Explain the precautions to be observed when applying Buy Ballot's Law.

Q.3 Sketch and describe the whirling Psychrometer. What are the advantages of the whirling psychrometer over the hygrometer?

Q.4 What are isobars and how are they used to predict weather? With suitable sketches describe any THREE isobaric patterns and the weather associated with them.

Q.5 Differentiate between the following:
i) Gust and Squall ii) Sea and Swell iii) Veering and Backing

Q.6 a) Describe the classification and properties of air masses.
b) What are the factors affecting the properties of an air mass?

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GOVERNMENT OF INDIA

Date: - 15th January-2021

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Encode the following weather report from a ship station:
Call sign, VVPY, position 28^{O} 08' N, 160^{O} 32'E, course made good over last 3 hours 265^{O}T at 14.2 knots, GMT 25th Day, 18 hrs 00 min, wind north-east estimated at 14, visibility 2000m, pressure 1004mm, tendency – 1.5 mm, barograph trace, increasing then decreasing, dry temperature 30.5^{O}C, wet 26.2^{O}C, clouds: sky o'cast with few blue patches, clouds 6-oktas, base 600m above sea level, Cumulus of strong vertical extent, Alto-cumulus in a chaotic sky, Present weather: poor visibility due to rain, Past weather: Drizzle and rain, Sea: Period 4 seconds, sea wave height 2 meter, Swell direction from 160^{O}T, period 8 seconds, wave height 3m.

Q.2 a) Vessel course 235^{O}T, speed 15 knots. The anemometer shows wind direction 223^{O}T at 10.4 knots. Calculate true wind direction and speed.
b) State Buys Ballot's law and its applications.

Q.3 Define dew point. Describe its application in hold ventilation on ships. How is dew point obtained and which instruments are used for this?

Q.4 a) What is the difference between Isobars and Isallobars?
b) What is barometric tendency? Explain how it can be used to predict movement of pressure systems?

Q.5 Describe the formation of fog, and list its types with brief description of each. Explain why there is persistent fog off the Grand Banks of Newfoundland.

Q.6 Define Isobars. List and describe various Isobaric Patterns.

**********X***X**********

GOVERNMENT OF INDIA

Date: - 8th December-2020

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Decode the following report:

BBXX	ATVH	10123	99408	30492	41398
62828	10143	20082	40084	56028	76364
84364	22234	00175	20808	302//	41006

Q.2 a) On the monkey Island of a ship, steering a course of 117^{O}T at 16 Knots, an anemometer & wind vane showed 15 Kts & 036^{O}. Find the direction & speed of the true wind?

b) Explain Wind information available from Wind rose with Diagram.

Q.3 State the principle and describe the working of an aneroid barometer with suitable sketch.

Q.4 a) Explain the difference between:

i) Drizzle and rain, &

ii) Mist and Fog

b) Describe the information contained in the coastal weather bulletin.

Q.5 Describe the different types of clouds giving the probable height of formation of each type of cloud.

Q.6 Explain the following:-

a) Sea and swell

b) Significant wave height, and

c) Bore tide.

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GOVERNMENT OF INDIA

Date: - 13th November-2020

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Decode the following report:

AAXX	06183	43057	41798	53628	10324
20208	40069	51042	71682	83262	222//
00282	20606	324//	41008		

Q.2 a) A vessel steering NW x N at 18 kts, experiencing apparent wind @ 10 kts, coming from 22.5 degrees on the port bow. Find the direction and speed of the true wind.
b) What are the various means of finding out true wind directions at sea?

Q.3 With the help of the simple sketch, explain the operating principle, working, care and maintenance of an Aneroid Barometer.

Q.4 Differentiate between:
a) Arctic Sea Smoke and Smog
b) Sea & Swell
c) DALR & SALR
d) Veering & Backing

Q.5 Discuss formation of South West Monsoon. Draw suitable sketch to show wind and surface current pattern in Arabian Sea.

Q.6 a) Explain Fohn-wind effect?
b) Why is diurnal range of atmospheric temperature over land is higher than that over sea?

**********X***X**********

GOVERNMENT OF INDIA

Date: - 9th Oct-2020

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather report using Ship's Weather Code 1982:
Call Sign: "ELFG 6" in Position 03^{O}15'S 015^{O}17'W at 1335 UTC on 16th September, steered a course of 100^{O} at 16 knots. Estimated wind: south westerly at 10 knots. Barometric pressure: 998 mb, barometric trace decreasing and then increasing, no change in last three hours. Visibility 17 km. Temperature: Dry 32.5^{O}C Wet 29.5^{O}C. Clouds ¾ of the sky. Low clouds SC ½ of the sky. Ac in chaotic sky. Ci in the form of filaments as hooks. Present and past weather were not of significance.

Q.2 a) A vessel on a course of 320^{O} speed 15 knots. The anemometer and wind vane showed 20 knots and 045^{O}(T) respectively. State what entry is to be made in weather report regarding wind direction and speed.
b) Describe Beaufort Wind Scale.

Q.3 Sketch and describe Mason's Hygrometer and Stevenson Screen.

Q.4 Describe an air mass. What are the factors effecting it? Name some typical air masses and state their characteristics.

Q.5 Describe the formation of following types of fog:

a) Advection b) Radiation
c) Arctic sea smoke d) SMOG

Q.6 Describe causes, characteristics, time and location of Monsoons.

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GOVERNMENT OF INDIA

Date: - 4th March-2020

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather report using Ship's Weather Code 1982:
Call Sign: JACK, Position: Posn. 10^{O} 37' N 098^{O} 45'E, Co. made good: 090^{O}T, Speed: 16 Kts, Time: 06d 01h 35m GMT, Wind: 203^{O}T estimated 20 Kts, Visibility: 6Km, Pressure: 1005.7 mb, Tendency: +3.0 mb. Trace shows pressure increasing then steady. Temp: Dry 32.0^{O}C, Wet 29.5^{O}C, Sea 20.5^{O}C Clouds covering $6/8^{th}$ of the sky. Low clouds 3 oktas with base 500 meters above sea. Cu of a strong vertical extent. Ac in a chaotic sky. Cc also present.
Present Weather: Intermittent heavy rain.
Past weather: Clouds covering more than half the sky throughout the period and rain.
Sea: Period 08 seconds, Height: 1.3 meters. Swell: Direction 188^{O}T Period: 08 seconds, Height: 1.8 meters and from 132^{O} Period 12s, Height 2.3 metres.

Q.2 Describe the seven isobaric patterns and the weather associated with them.

Q.3 a) Define veering and backing.
b) Vessel's course 217^{O}G @ 14 kts. The wind indicated by the anemometer is 45^{O} on the port bow @ 25 kts. What is the true wind? Gyro error 1^{O}(L).

Q.4 Sketch and describe any one type of Anemometer. How does it work? What kind of information we get from it?

Q.5 How are clouds classified based on their forms and heights? Briefly explain how Convention & Orographic clouds are formed.

Q.6 Write short notes on:
i) RADIATION FOG ii) RIME

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GOVERNMENT OF INDIA

Date: - 14th Jan-2020

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather report:

Ship: ATKJ, Position $9^{O}37'N$ $093^{O}14'W$, date and time of observation: 10 May / 0235 IST, Course made good in last 3 hrs, North at 16 Knots. Visibility: 10 Km, Wind: 135^{O} estimated at 26 knots, Atmospheric pressure at 10/0235 IST was 998.5 mb and at 09/2235 was 1002.5 mb, Barograph trace: Falling then steady. Temperature: Dry $28^{O}C$, Wet $25^{O}C$, Sea $22^{O}C$.
Clouds: 6/8 of the sky. Low clouds 4/8 of the sky 600 metres above sea level, Cu with little vertical extent, Ac in chaotic sky, Ci in the form of hooks progressively invading sky. Present weather: Thunderstorm but no precipitation at the time of observation. Past weather: Cloud covering more than ½ sky throughout the period and passing showers. Sea waves: Period 8 seconds, height 1.3 metres. Swell: from 183^{O} period 10 seconds, height 2.2m.

Q.2 a) What is Isobar? How does it differ from an Isallobar?
b) Explain 'change of pressure with height'. What happens to atmospheric temperature in Stratosphere?

Q.3 a) Describe Coriolis force.
b) Vessel's course 150^{O}(T), speed 13 kts, Anemometer reading 30 kts and pointing into a direction two points on port quarter. Find true wind direction and speed. What entry would you make in log book with respect to wind direction and Beaufort scale force?

Q.4 Write short notes on: a) Buy's Ballots Law b) N E Monsoon c) DALR & SALR
d) Anabatic Wind

Q.5 Sketch and describe Whirling psychrometer. How does it help us on board a ship?

Q.6. a) Describe formation of cloud by convection and by orographic lifting.
b) Write types of clouds as per their heights.

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GOVERNMENT OF INDIA

Date: - 4th Nov-2019

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather report using Ship's Weather Code 1982:

"Laha" in position $23^{O}10'S$ $041^{O}47'W$ at 1735 UTC on 6th August, observed following weather: Wind 245^{O}speed 12 knots by estimation, sea waves 1.5m period 8 sec. swell from 225^{O}hieght 2.5m period 10 sec. Barometric pressure corrected was 1002 hPa. Decreased steadily in the last three hours Change 2 hPa in the last three hours. Present weather moderate rain showers. Past weather: Rain showers. Sky: Overcast. Lowest clouds: 300 meters. 3/4th sky stratus in continuous layer. Medium clouds 1/4th Sky nimbostratus. Visibility: 2 N.M. Temp: Dry bulb $18.5^{O}C$, Dew Point temp. $18.3^{O}C$, Sea surface temp. $19.2^{O}C$.

Q.2 a) A vessel on a course of 070^{O} speed 15 knots. Wind speed as estimated by observing the appearance of sea surface is 33 knots. Funnel smoke was blowing towards 350^{O}. State what entry is to be made in weather report regarding wind direction and speed?

b) Explain Buys Ballot's Law with a suitable sketch.

Q.3 Explain with a suitable sketch the working principle of an aneroid barometer. What corrections need to be applied to the barometer readings?

Q.4 Define the following meteorological terms: a) D.A.L.R. b) Barometric tendency c) Sleet d) Hoarfrost e) Ridge

Q.5 List different types of fog. Explain why there is persistent fog off the Grand banks of New foundland.

Q.6. What is Dew point temperature and is it obtained. What is importance in cargo hold ventilation?

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GOVERNMENT OF INDIA

Date: - 9th Sept-2019

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following weather observation taken on vessel at 1750 IST on 4th January, when vessel was at 50° 12 N, 030° 17'W, Ship ATGV, Wind speed 42 Knots, Height of the base of the Lowest Cloud is 300Mts. Horizontal Visibility 0.21 nautical miles. The sky is fully covered by clouds.

The wind is blowing from 090°, Air Temp. +7.5°C, Dew point Temperature +7.2°C.

Barometric Pressure is 995.2 hPa. The barometer has fallen steadily in the last three hours decreasing by 2.1 hPa. There is intermittent moderate rain (not freezing) at the time of observation: Vessel experienced drizzle and rain since 1150 Hrs IST. A layer of Nimbostratus cloud covers the sky. The ship course is 270° and the speed 14 Knots.

The sea temperature (measured by intake) is +7.0°C. Sea waves are estimated to be 5 mts high, with a period of 10 seconds, the swell waves are coming from 180°, height 4 mts period 16 seconds. The wet bulb temperature is +7.4°.

Q.2 a) A vessel on a course of 090° speed 19 knots. The wind estimated by observing the sea surface was 22 knots. Funnel smoke was blowing towards South. State what entry is to be made in weather report regarding wind direction and speed?

b) Explain with a suitable sketch the "Wind Rose" given in the Admiralty Sailing Directions.

Q.3 Sketch and describe Hygrometer and Stevenson Screen. What precautions are required in its use?

Q.4 Write short notes on:

a) Convection clouds

b) Relative humidity

c) Barometric Tendency

Q.5 a) What is an air mass and how air masses are classified?

b) What is a front? How fronts are depicted on a weather map?

Q.6. Explain the factors to be considered by ship's officers for weather routing of his ship.

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GOVERNMENT OF INDIA

Date: - 11th July-2019

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Decode the following report:-

BBXX	ATVH	10123	99408	30492	41398
62828	10143	20082	40084	56028	76364
84364	22234	00175	20808	302//	41006

Q.2 a) On a course of 154^{O}T at 13 knots, an anemometer & bridge showed a wind speed of 32 knots. The direction of wind by observing line of waves was WSW. What entry is to be made in the weather report with respect to wind direction & speed? If an observer on the vessel threw up a piece of paper, in which direction would it fly off?

b) State Buys Ballot's Law. Explain the precautions to be observed when applying Buys Ballot's Law in the vicinity of land and near the equator.

Q.3 What precautions & corrections are to be taken / applied when using aneroid barometer.

Q.4 a) Sketch & describe the use of Barograph.

b) Describe with a sketch the features of a developed middle latitude depression.

Q.5 a) Enumerate the classification of clouds as per their Height.

b) Draw symbols of warm, cold and occluded front depicting their general movement.

Q.6. a) What is Pressure Gradient?

b) With regard to straight Isobars, Explain what is Geostrophic Wind?

c) Why is the actual direction & speed of wind on the earth's surface different from the geotropic wind?

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GOVERNMENT OF INDIA

Date: - 7th May-2019

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory; attempt any four out of remaining five Questions.
2. All Questions carry equal marks.
3. Use ships weather code 1982.

Q.1 Code the following in a suitable format for transmission:-

A ship: MV Imagine, call sign:

LGMW, position 01^{O} 25'N, 178^{O} 05'E, UTC time 0910, UTC date – 17 June, SMT 2110, Course made good in last 3 hours 165^{O}, speed: 17 kts, estimated wind: 136^{O} at 14, visibility 16 KM, atmospheric pressure: 987.6 hpa, barometric tendency: +2.5 hpa, increasing steadily. Temp: dry 28.0^{O}C, wet: 23.0^{O}C, sea: 22^{O}C, clouds- fully covered with clouds except for few blue patches, low cloud cover: 4 oktas, base 1000 M above sea, Cu of little extent and seemingly flattened. Ac of a chaotic sky, Cc alone. Present wx: State of sky on the whole unchanged, past wx:- cloud covering more than ½ of the sky throughout the appropriate period, rain, Sea period 07 sec, height: 03 mtrs, swell coming from east period 7 sec, height: 03 mtrs.

Q.2 a) A Vessel steering a course of 160^{O}(T) at a speed of 12 Knots, found wind speed of 10 kts from anemometer & funnel smoke was blowing towards 025^{O}(T). Find what entry is needed in Log book?

b) What is Buys Ballot's Law?

Q.3 Draw a neat Sketch of a Barograph & label its parts.

Q.4 a) What is the difference between Isobars and Isallobars?

b) What is barometric tendency? Explain how it can be used to predict movement of pressure systems?

Q.5 a) Define Fog & Mist & explain how it is formed.

b) Explain Land & Sea Breeze.

Q.6. Sketch and describe the lifestyle of a frontal depression. What kind of weather will be encountered during passage of cold front?

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GOVERNMENT OF INDIA

Date: - 7th March-2019

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory.
2. Attempt any four out of five Questions from the remaining.
3. All Questions carry equal marks.
4. Use ships weather code 1982.

Q.1 Code the following weather report using Ship's Weather Code 1982:
Call Sign: VQQG, Position: 00^{O} 01'N 179^{O} 55'E, Course made good: 179^{O}T, Speed: 14.5 knots, Time: 12d 18h 30m GMT, Wind 048^{O} T estimated 12 kts, Visibility: 1km, Pressure: 1003.5mb, Barometric Tendency: +2.3 mb. Trace shows pressure increasing steadily at first and then steady.
Temperature: Dry 32.0^{O} C, Wet 27.5^{O} C, Sea 19.5^{O} C.
Clouds covering $5/8^{th}$ of the sky. Low clouds 3 oktas with base 500 meters above sea. Cu of strong vertical extant. Ac in a chaotic sky. Cc also present.
Present weather: Thick haze, thunderstorms.
Sea: Period 08 seconds, Height 0.5 meters
Swell: Direction 170^{O} T, Period 10 seconds, Height 2.0 meters.

Q.2 a) Write short notes on Trough and Ridge.
b) On a course of north at 11 knots, find the apparent wind direction and speed if a true easterly wind of 14 kts was blowing.

Q.3 With the help of a simple sketch explain the operating principle, use working errors care and maintenance of Anemometer.

Q.4 Write short notes on:
a) Classification of clouds
b) Adiabatic Change of Temperature
c) Occluded front

Q.5 Explain the following:
a) The lee side of a mountain range is drier than the windward side.
b) Polar Regions are cooler than equatorial regions.

Q.6. a) What is a frontal Depression?
b) What are weather Analysis & Weather Prognosis Charts?

**********X***X**********

GOVERNMENT OF INDIA

Date: - 4th Jan-2019

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Use ships weather code 1982.
2. Question 1 is compulsory; Attempt any four out of remaining five Questions.
3. All Questions carry equal marks.

Q.1 Decode the following weather report:

BBXX	VHAN	16003	99000	10469	41593
70510	10285	20208	40088	53036	70694
84299	22242	00206	20401	327//	40808

Q.2 a) A vessel steering 060^{O}(T) at 15 kts, experiencing apparent wind @ 14kts coming from 30^{O} on port bow. Find the direction and speed of true wind.
b) What are the various means of finding out true wind directions at sea?

Q.3 What is Barometric Tendency? Sketch & describe a Barograph.

Q.4 a) Explain Foehn wind effect.
b) Why is the diurnal range of atmospheric temperature over land is higher than that over sea / ocean?

Q.5 a) Write the difference between Mist & Fog.
b) Describe various types of Fog and their formations.

Q.6. a) Explain sea breeze.
b) Explain formation of orographic clouds.

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GOVERNMENT OF INDIA

Date: - 5th Nov-2018

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Use ships weather code 1982.
2. Question 1 is compulsory; Attempt any four out of remaining five Questions.
3. All Questions carry equal marks.

Q.1 Code the following:
Call Sign: VWPP, Position 13^{O} 15'N 087^{O} 27'W, 13th February, Wind 120 (T), speed 23 knots, sea wave 3m, period 3 sec, Swell from 210 (T), height 2.5m, period 08 sec, No secondary swell, Barometer was read at 0230 IST and corrected pressure was 1002.4 mb, the pressure having fallen steadily by 2.7 mb and the ship having steered an effective Course of 305 (T) during last 3 hours. Weather at the time of observation: Moderate thunderstorm without hall. Past weather: Cloud covering more than half of the sky throughout the period, showers. Visibility: 0.21 nautical miles, Air Temp: Dry + 27.50 C, Wet 26.00 C, Sea surface temp: 25.00 C.
Cloud bases 250 metre, total cloud covers 6 oktas, and low clouds cumulonimbus with anvil, accompanied by cumulus: covering 4 oktas, Medium Cloud: Altocumulus with cumuliform tufts, High Clouds: Cirrus originating from top of cumulonimbus.

Q.2 (a) Discuss the formation of S.W. Monsoons.
(b) A vessel steaming due east at 19 knots in open sea, observes the sea surface and estimates wind to be 22 knots. A handkerchief held up was observed to blow towards south. State what entry is to be made in the weather report regarding wind direction and speed?

Q.3 Sketch and describe Masons hygrometer and Stevenson screen.

Q.4 Define the following meteorological terms: a) D.A.L.R. b) S.A.L.R
c) Barometric tendency d) Westerlies.

Q.5 a) Describe how cumulus and stratus clouds are formed, and how do they differ from each other.
b) Describe the difference between radiation fog ad advection fog.

Q.6. What are isobars, and how are they used to predict the weather? With suitable sketches describe any 3 isobaric patterns and weather associated with them.

**********X***X**********

GOVERNMENT OF INDIA

Date: - 7th Sept-2018

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Use ships weather code 1982.
2. Question 1 is compulsory; Attempt any four out of remaining five Questions.
3. All Questions carry equal marks.

Q.1 Code the following:
Call sign QRST, Posn. 38°11' N 087°17' W, Ships Co, 210° (T) Speed 21 Kts, Nov 11th 1800 hrs. Wind estimated 20 kts, Direction SxW. Visibility 4 Km. Barometer pressure 998.5 hpe, tendency 3.0 hps, Trace: failing, Dry Bulb: 29.5°C, Wet Bulb 28°C, Sea Temp. 26°C. Totally overcast sky. Low clouds 5/8 Octas, Base 300m above Sea Level. Cb, Ac with Ns, High clouds not visible. Present weather: continuous drizzle, Past weather. Overcast with rain. Sea Period: 12 Sec, Height 3.5m, Swell Direction 125 (T), Period 9 Sec, Height 2.5m.

Q.2 a) A vessel on a course of 320° speed 15 knots. The anemometer and wind vane showed 20 knots and 045° (T) respectively. State what entry is to be made in weather report regarding wind direction and speed?
b) Explain Pressure Gradient Force and Coriolis Effect.

Q.3 a) Describe the working and use of a whirling psychometer.
b) Describe the formation of following types of Fog:
- i) Advection Fog
- ii) Radiation Fog
- iii) Arctic Sea Smoke
- iv) SMOG.

Q.4 Explain the following:-
- i) DALR
- ii) Dew Point
- iii) Ridge
- iv) Trough of Low Pressure

Q.5 a) Explain formation of Mist & Fog. Describe method of estimating Visibility at sea – by day and night.
b) Define briefly the following terms which can affect visibility and safety Rain, drizzle, hail, sleet and freezing spray.

Q.6. Describe briefly the types of weather information received by Facsimile Receiver. How are storm warnings received on board?

**********X***X**********

GOVERNMENT OF INDIA

Date: - 5th July-2018

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory.
2. Attempt any four out of the remaining.
3. All Questions carry equal marks.
4. Use ships weather code 1982.

Q.1 Decode the following weather report:

BBXX	ATUX	14183	99234	70205	41498
63034	10186	20152	49998	52012	75085
86602	22264	00170	21206	330//	41208

Q.2 a) A Vessel was steering a westerly course at 15knots. The wind direction and speed displayed by anemometer was 060^{O}(R) on port bow at 10knots. What entry for true wind is to be made in ships logbook and weather message respectively.
b) Write short notes on Trade winds.

Q.3 Draw a neat sketch and explain the functioning of barograph. What precautions are required to be taken in its care, maintenances and its use?

Q.4 Explain the following:-
a) Buys Ballot's law
b) Geostrophic wind scale.

Q.5 Explain as to how different type of fog can form

Q.6. Explain the following:-
a) Sea and swell
b) Tsunami

**********X***X**********

GOVERNMENT OF INDIA

Date: - 4th May-2018

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:
1. Question 1 is compulsory.
2. Attempt any four out of the remaining.
3. All Questions carry equal marks.
4. Use ships weather code 1982.

Q.1 Encode the following meteorological observation made by ship:
Call Sign: WMKJ, position: 15^{O} 46' N, 085^{O} 59'E
Date / time of observation: 10July / 0240 IST.
Course and speed made good in last three hours: 210^{O} at 12 kts.
Wind estimated: SSW'ly / 28 knots, Visibility: 1500 mtrs.
Atmospheric pressure: at 0240 IST / 10 July – 998 hpa, at 2230 IST / 09 July – 1002.4 hpa
Barometric trace:

Temp: Dry bulb: 28.5^{O} C, Wet bulb: 25^{O} C, Sea: 23^{O} C
The sky was almost overcast, Clouds: St at height of 600 m was covering half the sky, with dense Cu as above obscuring the rest of the sky. The sequence of weather experienced: raining from 2200 IST / 09 July Thunder heard between 0100 & 0200 IST / 10 July. Heavy rains from 0200 IST onwards. The sea was in a confused state.

Q.2 a) Vessel steering WSW at 14 Knots. Wind direction obtained from anemometer is 3 points on the port bow. Wind speed at 17 knots estimated by sea appearance. State the log book entry to be made regarding wind. In which direction will sea spray fly?
b) Describe characteristics and location of Trade winds.

Q.3 Sketch and describe the principle and working of Wind Vane and Anemometer.

Q.4 a) Define an air mass.
b) What are the factors affecting the properties of an air mass?
Name some typical air mass and briefly describe their characteristics.

Q.5 Write short notes on:
a) Adiabatic change of temperature, Saturated adiabatic lapse rate (SALR) and Environmental lapse rate (ELR).
b) Describe the classification of clouds as per height and types.

Q.6 a) Differentiate between the following:
i) Gust and Squall **ii)** Sea and Swell **iii)** Veering and Backing.
b) Describe the various types of information received by facsimile weather receiver.

**********X***X**********

GOVERNMENT OF INDIA

Date: - 7th March-2018

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory.
2. Attempt any four out of the remaining.
3. All Questions carry equal marks.
4. Use ships weather code 1982.

Q.1 Code the following ship's full reports, using the ship's weather code 1982:

Date and GMT	: 4 May, 1800 GMT
Ship's call sign	: ATVH
Ship's position	: 52^{O} 42'N, 020^{O} 30'W
Ship's course / speed	: 180^{O}T / 15 knots
Wind	: 080^{O}T, speed 9 knots estimated
Weather	: cloudless, no significant phenomenon
Visibility	: 8.8 nautical miles
Barometric pressure	: 1020.3 mb
Barometric tendency	: Increasing then increasing slowly Changed 0.4 mb in last 3 hrs
Air temperature	: + 14.3^{O}C
Dew point temp	: + 6.8^{O}C
Sea temperature	: + 13.0^{O}C
Sea waves	: period 4 seconds: Height 0.8 meter
Swell	: Dir. 130^{O}T, period 6 seconds: height 1.5 meters

Q.2 a) Course 295^{O} speed 16 knots out in open sea. Wind force 4 (18 knots), estimated by appearance of the sea surface. Smoke from the funnel was observed to be blowing to NNE. What entry is to be made in the weather report with respect to wind direction and speed?
b) What is coriolis force? How does it affect the wind blowing over sea and land?

Q.3 Compare mercury barometer with aneroid barometer. Discuss various errors, and their respective features.

Q.4 List the seven isobaric patterns. Explain briefly each of them with appropriate sketches.

Q.5 Describe the weather associated with:
a) "Anticyclone" in Northern hemisphere.
b) 'Col' in southern hemisphere.

Q.6 a) Sketch and describe the symbols and isobaric patterns shown in weather charts and synoptic charts.
b) Explain why polar regions are colder than equatorial region.

**********X***X**********

GOVERNMENT OF INDIA

Date: - 4th January -2018

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 Hours **PASS MARKS: 50** **MAX. MARKS: 100**

Notes:

1. Question 1 is compulsory.
2. Attempt any four out of the remaining.
3. All Questions carry equal marks.
4. Use ships weather code 1982.

Q.1 Encode the following weather observation made on board the M.V. Hindship, call sign 'ATTF' in 13^{O} 15'S 087^{O} 27'E 13 February. Wind: 120^{O}T, speed 23 knots, sea waves 3m, period 3 sec. Swell: From 210^{O}(T), height 2m, period 06 sec, No secondary swell. Barometer was read at 1730 IST and corrected pressure was 1002.4 MB, the pressure having fallen steadily by 2.7 MB and the ship having steered an effective course of 305^{O}T during the past 3 hours. Weather at the time of observation: Moderate thunderstorm without hail. Past weather: Cloud covering more than half of the sky throughout the period, showers. Visibility: 12 km. Air temp: Dry bulb: $+27.5^{O}$C, wet bulb: $+26^{O}$C. Sea surface temp: $+25^{O}$C cloud bases 250 metre, total cloud covers 6 oktas, and low clouds cumulonimbus with anvil, accompanied by cumulus; covering 4 oktas. Medium clouds: Altocumulus with cumuliform tufts. High clouds: Cirrus originating from top of cumulonimbus.

Q.2 a) Describe Beaufort wind scale
b) On a course of North at 12 knots, find the apparent wind direction and speed if a true NW wind of 8 knots speed was blowing.

Q.3 Sketch and describe an Aneroid barometer and various corrections to be applied for pressure reading?

Q.4 Describe with a sketch the features of a developed middle latitude depression. List the weather condition on observer will encounter at the passage of the cold front.

Q.5 Explain the following:
a) Formation of clouds due to "Turbulence" and
b) Convection

Q.6 Enumerate the weather associated with warm front, cold front and occluded front. Draw the symbols used in weather charts to depict these fronts.

**********X***X**********

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

8-11-17

TIME: 2 HOURS **PASS MARKS: 50** **MAX MARKS: 100**

Notes:
1. Question 1 is compulsory
2. Attempt any four out of five Questions from the remaining
3. All Questions carry equal marks
4. Use ships weather code 1982

Q.1 Decode the following ships weather report:

BBXX	H3BB	25063	99308	30452	41398
62828	10143	20082	40086	56028	76364
84364	22234	00175	20808	302//	41006

Q.2 (a) A vessel steaming due East at 14 knots, in open sea, observes the sea surface and estimates the wind force to be the lower limit of force 5 (17 knots). A handkerchief held up was observed to blow towards South. State what entry is to be made in the weather report regarding wind direction and speed?

(b) List the information available from wind rose

Q.3 Sketch and explain the principle, working and use of a Barograph. State the weekly schedule/duties of OOW with respect to barograph and barograms

Q.4 Explain the "Formation of clouds" due to following:
(a) Turbulence (b) Convection

Q.5 Differentiate between the following:
(i) Gust and Squall (ii) Sea and Swell (iii) Veering and Backing

Q.6 (a) Describe the classification and properties of air masses
(b) What are the factors affecting the properties of an air mass?

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GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

Code 80A

TIME: 2 HOURS | PASS MARKS: 50 | MAX MARKS: 100

Notes:
1. Question 1 is compulsory
2. Attempt any four out of five Questions from the remaining
3. All Questions carry equal marks
4. Use ships weather code 1982

Q.1 Code the following ships report
Ship's Call Sign: VWHM
Position: 00°05'S 46°57'W, Course made good past three hours:150° at 12 knots,
GMT:15d 00h 10m,Wind : 072° estimated at 15 knots
Visibility:1500 metres , pressure 1008.8mb, Tendency - 2.6mb, Barograph trace : ___
Temperature: Dry 28.5°C, Wet 23.0°C, Sea 20.6°C
Clouds: Sky overcast with a few blue patches
Low clouds 4 oktas, base 600 metres above sea,
Cu of strong vertical extent, Ac in a chaotic sky, Cc
Present weather: visibility poor due to dust in suspension in the air, NOT raised by wind at or near ship. Past weather: Thick haze, thunder storm
Sea: Period 04 seconds , height 0.4 metres
Swell: From 270°, period 08 seconds, height 04m

Q.2 (a) A vessel is proceeding on a course of 073° at a speed of 14 knots. If the wind direction by observation of the line of waves was 165° and the wind speed estimated by the appearance of the sea was 25 knots, state what would be the apparent wind direction & speed?
(b) State how wind speed can be predicted using Geostrophic wind scale on a weather map?

Q.3 With the help of a neat sketch describe the functioning of a Aneroid barometer, what are the errors possible? List precautions to be taken while using the same?

Q.4 Describe in detail three basic isobaric patterns with the help of suitable sketches

Q.5 Explain the "Formation of clouds" due to following:
(a) Turbulence (b) Convection

Q.6 Explain formations of following:
(a) NE Monsoon (b) Land and Sea breezes

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GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

Code AX

TIME: 2 HOURS | PASS MARKS: 50 | MAX MARKS: 100

Notes:
1. Question 1 is compulsory
2. Attempt any four out of five Questions from the remaining
3. All Questions carry equal marks
4. Use ships weather code 1982

Q.1 Code the following weather report using Ships weather code 1982:
Call sign: ATDV, Position: 23° 24' N, 080° 35' E, CMG: 110° T, SMG: 18 Knots, Visibility: 30 KM, Wind: 110° T, estimated at 16knots, Atmospheric pressure: 1014mb, Barometric tendncy: +3.5mb, Barometric trace: steadily ascending, GMT 12d 09h 00m, Temp: Dry bulb 25.5° C, Wet 22.3° C, Sea 22° C, Clouds: Total 6/8th of the sky, Low clouds 3/8th of the sky base 600m above sea level. Sc not resulting from cu, Dense Ns, Ci in hooks progressively invading sky. Present weather: Precipitation near but not at station. Past weather: Clouds covering more than ½ sky throughout & intermittent drizzle. Sea: Period 07s, height 1m, Swell: from 240° T, Period 08s, Height 2M

Q.2 (a) On a vessel steaming 320° True at 15 knots, the anemometer showed 20 knots and wind vane showed 20 knots and 045° True. Find the direction and speed of true wind, State the entry you would make in the Deck Log Book

(b) Explain with differences between drizzle and rain, mist and fog

Q.3 Explain with suitable sketch the working principle of whirling psychrometer. State the precautions to be taken in its use

Q.4 Explain the following:
(a) Insolation (b) Dew Point temperature
(c) Barometric tendency (d) Katabatic winds

Q.5 (a) Explain how Advection fog and Arctic sea smoke are caused?
(b) List the factors affecting air mass properties. How air masses are classified

Q.6 (a) Explain with suitable sketch ridge and col
(b) Explain fetch and significant wave height

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JULY - 2017

GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

Code 82A

TIME: 2 HOURS **PASS MARKS: 50** **MAX MARKS: 100**

Notes:
1. Question 1 is compulsory
2. Attempt any four out of five Questions from the remaining
3. All Questions carry equal marks
4. Use ships weather code 1982

Q.1 Decode the following ships weather report:

BBXX	PQRS1	16004	99506	70554	41496
73620	10092	20079	40012	57041	76166
84221	22274	00071	20905	33335	40706
51004					

Q.2 (a) On a vessel steaming 060° True at 16 knots, the anemometer showed 16 knots. The line of waves indicated the direction of the wind to be 150°, State the entry you would make in the Deck Log Book and state the direction in which the funnel smoke will be blowing

(b) Explain with suitable sketch the Wind Rose given on Admiralty Routeing Charts

Q.3 Sketch and explain the principle, working and use of a Aneroid Barometer

Q.4 Write short notes on the following:
(a) Land breeze and Sea breeze
(b) Katabatic wind and Anabatic wind

Q.5 Describe the weather associated with the following:
(i) Col (ii) Ridge (iii) Trough (iv) Anti-Cyclone

Q.6 Explain how meteorological forecasts, synoptic and prognostic charts are used in weather routeing of a ship on trans-ocean voyage?

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GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

Code 84A

TIME: 2 HOURS **PASS MARKS: 50** **MAX MARKS: 100**

Notes:
1. Question 1 is compulsory
2. Attempt any four out of the remaining
3. All Questions carry equal marks
4. Use ships weather code 1982

Q.1 Code the following weather report
Ship : 3EMH9 in position 35023'N 1340 45'E, course and speed made good in last 3hrs:038 deg at 17.3 kts, visibility 7 km , wind WSW, estimate speed 20 knots, Pressure (corrected) 1012.4mb , increasing 1.2 mb , then steady in last 3 hrs , cumulus of moderate or strong vertical extent , no altocumulus , altostratus or nimbostratus , cirrocumulus accompanied by cirrus
Weather: Present: slight rain shower, past: clouds covering 1/2 or less of the sky throughout the period, drizzle.
Sea: Period 06 sec, height 03m
Swell: From 200 deg, period 09 sec, height 02m
GMT: 26d 06h 06m
Temp deg C: Dry 26, Wet 21.5, Sea 23
Cloud: total 3/8 of sky, low clouds 2/8 of sky; base 500m above sea.

Q.2 a) Vessel's course 1250 T, speed 15kts, funnel smoke was found to be blowing towards 0400T and wind speed obtained by anemometer was 18kts. Determine direction and speed of true wind
b) Draw and explain the information available from wind rose?

Q.3 With the help of a next sketch describe the functioning of a Aneroid barometer. What are the errors possible? List precautions to be taken while using the same?

Q.4 Assisted with figures, write short notes on the seven basic isobaric patterns

Q.5 a) Describe advection fog and steam fog with examples
b) Define Air Mass and its types. What are factors affecting the properties of an air mass

Q.6 a) Define relative humidity and dew point. How are they measured and what is their significance to a mariner
b) Describe with suitable sketch fohn wind effect

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Code 86A

GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEROLOGY

TIME: 2 HOURS **PASS MARKS: 50** **MAX MARKS: 100**

Notes:
1. Question 1 is compulsory
2. Attempt any four out of the remaining
3. All Questions carry equal marks
4. Use ships weather code 1982

Q.1 Decode the following weather report:

AAXX 06183 43057 41798 53628
10324 20208 40069 51042 71682
83262 222// 00282 20606 324//
41008

Q.2 a) Course 3080 (T) speed 14.5 knots. Direction of wind by observing line of waves is NNE. Speed of wind by ship borne anemometer -18 knots. State what direction and speed is to be entered in the logbook. State also, the direction towards which the funnel smoke will blow.
b) Describe Buys Ballot's Law and its limitations.

Q.3 Explain the purpose, method of use and maintenance of following meteorological instruments:
a) Hygrometer
b) Whirling Psychrometer

Q.4 Write short notes on:
a) Tropopause
b) Diurnal range of temperature
c) Geostrophic wind scale
d) Squall

Q.5 a) Define fog, mist and haze?
b) Describe the method of estimating visibility at sea by day and by night?

Q.6 a) Why is diurnal variation of atmospheric temperature over land more than over sea?
b) Describe the classification of clouds as per height from sea level?

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JAN 2017

GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: METEOROLOGY

Code 79A

TIME: 2 HOURS | PASS MARKS: 50 | MAX MARKS: 100

09/11/2016

Notes:
1. Question 1 is compulsory
2. Attempt any four out of five Questions from the remaining
3. All Questions carry equal marks
4. Use ships weather code 1982

Q.1 Code the following ship's full reports, Using the ship's Weather Code 1982

Date and GMT	: 4 May, 1800 GMT
Ship's Call Sign	: ATVH
Ship's Position	: 52°42'N, 020°30'W
Ship's Course /speed	: 180°T/15knots.
Wind	: 080°T,speed 9 knots estimated
Weather	: Cloudless. No significant phenomenon
Visibility	: 8.8 nautical miles
Barometric pressure	: 1020.3mb
Barometric tendency	: Increasing then increasing slowly. Changed 0.4 mb in last 3hrs
Air temperature	: + 14.3°C
Dew point temp	: + 6.8°C
Sea temperature	: + 13.0°C
Sea waves	: Period 4 seconds: Height 0.8meter.
Swell	: Dir.130°T: Period 6 sec: Height 1.5 meters

Q.2 (a) Course 295° speed 16 knots out in open sea. Wind force 4 (18 knots) estimated by appearance of the sea surface. Smoke from the funnel was observed to be blowing to NNE. What entry is to be made in the weather report with respect to wind direction and speed?
(b) What is Coriolis force? How does it affect the wind blowing over sea and land?

Q.3 (a) Sketch & Explain a Stevenson Screen
(b) What are the various corrections to be applied to an Aneroid Barometer reading?

Q.4 (a) How does Atmospheric Pressure vary with Height & what is the daily change in pressure?
(c) What is Barometric Tendency
(d) Difference between Isobars and Isallobars

Q.5 (a) Explain Different types of Fog
(b) Describe different ways of cloud formation?

Q.6 (a) What is an Air Mass
(b) Explain Cold & Warm Front with suitable sketches

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GOVERNMENT OF INDIA

SECOND MATE OF A FOREIGN GOING SHIP
OFFICER INCHARGE OF A NAVIGATIONAL WATCH

FUNCTION: NAVIGATION

PAPER: METEOROLOGY

TIME: 2 HOURS **PASS MARKS: 50** **MAX. MARKS: 100**

NOTES:

1. Question No. 1 is compulsory.
2. Attempt any four questions from the remaining.
3. All questions carry equal marks. Use Ships Weather Code 1982.

Q.1. Code the following ships report:
Ships call sign: VTDX; position 08^0 33'N, 067^0 38'E; course & speed made good past 3 hrs: 320 (T) at 14 kts: UTC time: 15d 07h 25m; wind : S by W, Estimated at 19 kts; visibility : 1600m Pressure: 1012.6mb; Tendency : -2.4mb; Barograph Trace: Decreasing then steady; Temperature Dry bulb: 23.5C, Wet bulb: 20.5 C; Sea Temp: 12.4C, Clouds: sky nearly overcast, Low clouds 6 octas , Base: 300m above sea level, cumulonimbus forming an Anvil, Ac resulting from cumulus, Cc alone. Present weather: Drizzle not freezing intermittent, past weather: continuous drizzle, sea period: 05 sec, Height: 4m, swell from SW, period : 06s, Height:4.5m

Q. 2 a) Explain the use and interpretation of wind rose.
b) A vessel is steering a course 117^0 (T) at a speed of 16 knots. Direction of wind as obtained by anemometer 036 degrees x 15 kts . State what direction and wind speed is to be entered in the log book? Towards which direction will the funnel smoke fly?

Q. 3 Sketch and explain the principle, working and use of a Barograph. State the weekly schedule/duties of OOW with respect to barograph and barograms.

Q.4 What is the Fohn wind effect? With the aid of sketch explain why one side of the mountain can be dry and the other side has rain .

Q. 5 **a.** Explain how Advection fog and Arctic sea smoke are caused?
b. List the factors affecting air mass properties. How air masses are classified.

Q.6 Differentiate between the following:
(I) Gust and Squall (II) Sea and Swell (III) Veering and Backing

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GOVERNMENT OF INDIA

SECOND MATE OF A FOREIGN GOING SHIP
OFFICER INCHARGE OF A NAVIGATIONAL WATCH

FUNCTION: NAVIGATION

PAPER: METEOROLOGY

TIME: 2 HOURS **PASS MARKS: 50** **MAX. MARKS: 100**

NOTES:

1.Question No. 1 is compulsory.
2.Attempt any four questions from the remaining.
3.All questions carry equal marks. Use Ships Weather Code 1982.

Q. 1 Decode the following weather report using Ship's Weather Code 1982:

BBXX PQRS1 16004 99506 70554 41496
73620 10092 20079 40012 57041 76166
84221 22274 00071 20905 33335 40706
51004

Q 2. A vessel steering a course of 130 T at 12 knots observed funnel smoke blowing towards 2 points port quarter. Same time sea wave observed to be coming from direction of 203(T).

State what entry to be made in log book regarding wind direction & speed.

Q. 3 Explain with suitable sketch the working principle of whirling psychomotor. State the precautions to be taken in its use.

Q. 4 a) Explain Buys Ballot's law and explain its limitations.
b) Explain Coriolis force.

Q. 5 Sketch and describe the formation of clouds due to Turbulence, Orographic lifting, Convection and Frontal lifting

Q6. Write short notes on:
a) Dew point
b) Barometric tendency
c) Advection fog
d) Doldrums

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GOVERNMENT OF INDIA

SECOND MATE OF A FOREIGN GOING SHIP
OFFICER INCHARGE OF A NAVIGATIONAL WATCH

FUNCTION: NAVIGATION

PAPER: METEOROLOGY

TIME: 2 HOURS **PASS MARKS: 50** **MAX. MARKS: 100**

NOTES:

1. **Question No. 1 is compulsory.**
2. **Attempt any four questions from the remaining.**
3. **All questions carry equal marks. Use Ships Weather Code 1982.**

Q. 1 Code the following weather message: Ship VHAN position 00° 05'N 046° 58'E, Course made good past three hours: 170° at 10 knots. GMT 16d 00h 20m, win: 052° estimated at 10 knots, visibility : 500 mtrs, pressure 1008.8 mb, tendency +3.6 mb, Barograph trace
Temperature: Dry 28.5° C, wet 23.0°C. Sea 20.6°C

Clouds: Sky over cast with a few blue patches. Low clouds 4 oktas, base 600 meters above sea, Cu of strong vertical extent, AC in a chaotic sky, CC alone

Present weather: Visibility poor due to dust in suspension in the air, NOT raised by wind at or near ship.

Past weather: Thick haze, thunder storm.

Sea: period 04 seconds, height 0.4 mtrs

Swell: From 270°, period 08 seconds, height 04m.

Q. 2 a) A vessel on a course of 300°T speed 15kts. The OOW holds up a ribbon and observes it to blow towards 040°. At the same time the anemometer showed 16 kts. Find the direction and speed of true wind
b) Discuss formation of south-west monsoon.

Q. 3 With a neat sketch explain the principle, use and errors of an Aneroid barometer.

Q. 4 Explain the formation of clouds due to the followings:
a) Turbulence b) Convection

Q. 5 Describe with suitable sketches the process of frontogenesis.

Q. 6 Write short notes on:
a) DALR
b) SALR
c) Relative humidity
d) Dew Point

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GOVERNMENT OF INDIA

SECOND MATE OF A FOREIGN GOING SHIP
OFFICER INCHARGE OF A NAVIGATIONAL WATCH

FUNCTION: NAVIGATION

PAPER: METEOROLOGY

TIME: 2 HOURS **PASS MARKS: 50** **MAX. MARKS: 100**

NOTES:

1. **Question No. 1 is compulsory.**
2. **Attempt any four questions from the remaining.**
3. **All questions carry equal marks. Use Ships Weather Code 1982.**

Q. 1 Encode the following meteorological observation made by ship:
Call Sign: WMKJ, position: 15° 46′ N, 085° 59′ E
Date/time of observation: 10July / 0240 IST.
Course and speed made good in last three hours: 210° at 12 kts.
Wind estimated: SSW'ly / 28 knots, Visibility: 1500 mtrs.
Atmospheric pressure: at 0240 IST / 10 July – 998 hpa, at 2230 IST / 09 July – 1002.4 hpa
Barometric trace: 

Temp: Dry bulb: 28.5° C, Wet bulb: 25° C, Sea: 23° C
The sky was almost overcast. Clouds: St at height of 600 m was covering half the sky, with dense Cu as above obscuring the rest of the sky. The sequence of weather experienced: raining from 2200 IST / 09 July Thunder heard between 0100 & 0200 IST / 10 July. Heavy rains from 0200 IST onwards. The sea was in a confused state.

Q. 2 a) Vessel steering WSW at 14 Knots. Wind direction obtained from anemometer is 3 points on the port bow. Wind speed 17 knots estimated by sea appearance. State the log book entry to be made regarding wind. In which direction will sea spray fly?

b) Describe characteristics and location of Trade winds.

Q. 3 a) Sketch and explain the principle, working and use of a Barograph. State the weekly schedule / duties of OOW with respect to barograph and barograms.

b) State in brief difference between Fog & Mist

Q. 4 a) Sketch and explain mean surface distribution of pressure on oceans during summer and winter months.

b) Describe classification of clouds as per height?

Q. 5 a) Describe advection fog and steam fog with examples.

b) Define Air Mass and its types. What are factors affecting the properties of an air mass.

Q. 6 a) Define relative humidity and dew point. How are they measured and what is their significance to a mariner.

b) Describe with suitable sketch Fohn wind effect.

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NOTES:

1. **Question No. 1 is compulsory.**
2. **Attempt any four questions from the remaining.**
3. **All questions carry equal marks. Use Ships Weather Code 1982.**

Q. 1 Code the following ship's report:
Ship's call sign: CMCX; Position 00°04'N, 045°58' W, course & speed made good past three hours: S by E at 12 knots, UTC time: 20d 06h 30m, Wind NE by E, estimated at 20 knots visibility: 800 meters, Pressure: 1012.6mb, Tendency : +2.8mb, Barograph trace: Increasing steadily or unsteadily. Temperature Dry bulb: 28.6°C, Wet bulb: 23.4°C, Sea: 20.6°C, Cloudst sky overcast with a few blue patches, low clouds 3 OKTAS, base 600 mtrs above sea level, cu of strong vertical extent, ac in a chaotic sky, C_c present.
Present Weather: Slight continuous rain, Past weather: Continuous drizzle, Sea Period: 04 Sec, Height: 3m Swell from EXS, Period: 08 sec height 05m.

Q. 2 a) Vessel's course 275° T, speed 14 kts, the wind direction and speed displayed by the anemometer was Stbd 060° and 7 kts. What entry for true wind is to be made in the logbook?
b) Define with one example: i) Squall ii) Westerlies

Q. 3 Sketch and describe an Aneroid barometer and various corrections to be applied for pressure reading?

Q. 4 a) What is the difference between Isobars and Isallobars? (10 marks)
b) What is barometric tendency? Explain how it can be used to predict movement of pressure systems? (10 marks)

Q. 5 What is 'Atmosphere'? Draw a neat sketch of the atmosphere and describe the various layers that constitute the atmosphere.

Q. 6 Describe formation of:
a) North East Monsoon.
b) Land and sea breezes

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