

(Paper Format)

Duration: 3 hrs.

SECOND MATE (F.G.)

Maximum Marks: 200

Pass Marks: 100

BRIDGE EQUIPMENT AND WATCH KEEPING

- Note:
1. ATTEMPT ANY 8 OUT OF 9 QUESTIONS.
 2. ALL QUESTIONS CARRY EQUAL MARKS

Q1. GYRO COMPASS, MAGNETIC COMPASS, AUTO PILOT, COURSE RECORDER, ROTI

Q2. DOPPLER LOG, ELECTRO MAGNETIC LOG, ECHO SOUNDER, OTHERS

Q3. ELECTRONIC POSITION FIXING SYSTEM

Q4. AIS, LRIT, VOYAGE DATA RECORDER, SEXTANT

Q5. BRIDGE PROCEDURES

Q6. IAMSAR, VTS PROCEDURES, SHIP REPORTING SYSTEMS

Q7. WATCHKEEPING, BRM

Q8. SAFETY, WATCH KEEPING, EMERGENCIES

Q9. MANOEUVRING

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: - 7th Nov-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) Describe the principle and working of a Doppler Log, list the main error sources of Doppler log.
b) Differentiate between ground reference speed and water reference speed.

Q.2 a) What is the principle of Automatic Identification System? What are the advantages of AIS?
b) Write a short note VDR.

Q.3 What are the contents of the Bridge Procedures Guide. Briefly describe each section of the guide.

Q.4 a) How will you know your vessel is dragging anchor?
b) Your vessel is at anchor, how will you take over your watch.

Q.5 With simple diagram, describe briefly:
a) With respect to stopping distance, explain head reach and track reach.
b) Williamson Turn.

Q.6 a) Your vessel ran aground. enumerate the action to be taken.
b) Describe the immediate actions to be taken in case of steering failure.

Q.7 a) With respect to GPS Explain the following:
i) Space segment and Ground segment.
ii) What factors affect the accuracy of a GPS positions.
b) Explain the difference between Raster and Vector Charts

Q.8 a) What is the purpose of IAMSAR? Explain the duties & responsibilities of the On-scene co-ordinator.
b) State the objectives and limitations of the VTS system.

Q.9 With regards to Gyro compass, briefly explain:
i) Precession of the axis,
ii) Drift and tilt
iii) Procedure to determine the compass error.

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GOVERNMENT OF INDIA

AM Paper

Date: - 7th Nov-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q1) a) What is Magnetic variation, why it varies and where you will find its value?
b) Write short notes on Pivoting and Tilting of a free Gyroscope?

Q2) Explain with block diagram principle of Doppler log and the limitations of same.

Q3) With respect to GPS write short notes on:
a) Space segment & Ground control segment
b) What is a clock-bias error?

Q4) a) Detail about AIS and the data AIS Provides, what are the precautions while using, alarms in AIS.
b) How is the communication carried out with another vessel using AIS.

Q5) a) What are the publications and manuals you require for the safe conduct of navigation?
b) What is IAMSAR? What is its use on board.

Q6) a) What are responsibilities of the bridge team when the pilot is on board?
b) What is the need for "Master/Pilot Exchange"?

Q7) Describe the interaction between ships in different situation while passing close by.

Q8) a) What factors will you consider in choosing a safe anchorage for your ship?
b) List out various methods by which you can determine, if the vessel is dragging anchor or not.

Q9) What is VTS and its purpose? What are the differences between VTIS and VTMS?

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GOVERNMENT OF INDIA

PM Paper

Date: - 9th Sept-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 Explain the principle of ROTI with a block diagram.

Q.2 Explain with block diagram principle of Doppler log and the limitations of same.

- Q.3** a) With respect to GPS, explain in detail various errors in GPS obtained position.
b) What are the advantages of ECDIS charts over the conventional paper charts.

- Q.4** a) Detail about AIS and the data AIS provides, what are the precautions while using, alarms in AIS.
b) How is the communication done with another vessel using AIS.

- Q.5** a) What are the publications and manuals you require for the safe conduct of navigation?
b) What is IAMSAR? What is its use on board.

- Q.6** a) What are the responsibilities of the bridge team when the pilot is on board?
b) What is the need for "Master / Pilot Exchange"?

Q.7 Describe the interaction between ships in different situation while passing close by.

- Q.8** Describe your actions as Officer in charge of the watch in following situations:
i) Your vessel dragging anchor towards another vessel 2 miles away.
ii) Collision with another vessel.
iii) Fire in Engine room.

Q.9 What is VTS and its purpose? What are the differences between VTIS and VTMS?

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GOVERNMENT OF INDIA

AM Paper

Date: - 9th Sept-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 With respect to GPS briefly explain the following:

- | | |
|--------------------------------|------------------------------------|
| a) Precise Positioning Service | b) Standard Positioning Service |
| c) Pseudo Range | d) Geometric Dilution of Precision |

Q.2 a) What is a free gyroscope? What are two properties of a gyroscope?

b) Explain the following with regards to Adaptive autopilot:

- | | | |
|-------------------------|------------------------|-----------------------|
| i) Proportional Control | ii) Derivative Control | iii) Integral Control |
|-------------------------|------------------------|-----------------------|

Q.3 Explain Rule 6 Safe Speed as per COLREGS.

Q.4 Explain the importance of Bridge Resource Management on board & factors that affect the effective use of BRM. Illustrate with on board situation.

Q.5 a) What factors would you consider in deciding the anchor position and amount of cable to use.

- b) Write short notes on: i) Pivot point ii) Transverse thrust iii) Drift angle.

Q.6 a) Describe the principle and working of a Doppler Log.

b) With respect to Echo sounder, explain the effect of density, temperature and pressure on the depth indicated.

Q.7 a) Describe the procedure for testing of controls prior departure from port.

b) State the circumstances under which you will call the master.

Q.8 a) Describe the use of VTS in navigation.

b) Describe the essential elements of Ship Reporting System and the types of reports to be made by the vessel.

Q.9 a) Explain how the automatic identification systems work?

b) List the data required to be recorded by a voyage data recorder.

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GOVERNMENT OF INDIA

AM Paper

Date: - 8th July-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 Explain what modifications are made to the free gyroscope and how it helps to eventually behave like north seeking gyro compass.

Q.2 Explain with block diagram principle of Doppler log and the limitations of same.

Q.3 a) Explain various GPS systems currently in use and which all countries they belong to and their position accuracy in meters.

b) What do you understand by "Pseudo range" & "True range."

Q.4 Write notes on the following:

- i) Various modules of VDR.
- ii) Difference between AIS & LRIT.

Q.5 Describe in brief the contents of the "Bridge Procedures Guide".

Q.6 What is VTS and its purpose? What are the differences between VTIS and VIMS?

Q.7 a) With respect to GPS Explain the following:

- i) Space segment and Ground segment
 - ii) What factors affect the accuracy of a GPS positions
- b) Explain the difference between Raster and Vector Charts

Q.8 Discuss your actions in the following emergencies:

- i) Man-overboard in restricted visibility.
- ii) Fire in pump-room of tanker in port.

Q.9 With regards to Gyro compass, briefly explain:

- i) Precession of the axis
- ii) Drift and tilt
- iii) Procedure to determine the compass error

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GOVERNMENT OF INDIA

AM Paper

Date: - 8th May-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 Explain the principle of ROTI with a block diagram.

Q.2 Explain the working of echo sounder with respect to phasing technique. What precautions must be exercised whilst using phasing technique?

Q.3 With regards to GPS, why do we require 3 satellites for a 2-dimensional fix. What action will you take when you find the navigation chart in use is not based on WGS84?

Q.4 a) Detail about AIS and the data AIS provides, what are the precautions while using alarms in AIS.
b) How is the communication done with another vessel using AIS.

Q.5 a) What are the publications and manuals you require for the safe conduct of navigation?
b) What is IAMSAR? What is its use on board.

Q.6 What are the different bridge manning levels? How will you take over watch as an OOW when pilotage progress?

Q.7 Describe the interaction between ships in different situation while passing close by.

Q.8 a) What factors will you consider a safe anchorage for your ship?
b) List out various methods by which you can determine, if the vessel is dragging anchor or not.

Q.9 a) Describe the use of VTS in navigation.
b) Describe the essential elements of Ship Reporting System and the types of reports to be made by the vessels.

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**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) Explain the working of an Auto Pilot and various settings of the Auto Pilot for optimal performance.

b) What are the various methods to monitor a radial turn?

Q.2 a) Explain with the aid of a block diagram the working of an Echo Sounder.

b) Describe the errors associated with Echo Sounder.

Q.3 Explain briefly with respect to AIS:

a) Functioning

b) Limitations

c) Types of messages

Q.4 Differentiate between the following:

a) AIS and LRIT

b) VDR and S-VDR

Q.5 Describe the actions you as an OOW will take when a man falls overboard in open sea and in extreme cold conditions.

Q.6 a) What is VTS and what are the benefits of implementing VTS?

b) Describe with suitable sketches the following search patterns as per IAMSAR:

i) Expanding square search

ii) Sector search

Q.7 Explain your action as a watchkeeping officer under the following cases:

a) Unmarked navigational mark sighted

b) Encounter restricted visibility

Q.8 With the help of a suitable diagram explain the following terms:

a) Transfer

b) Head Reach

c) Tactical diameter

d) Advance

Q.9 Briefly explain the following, with reference to the Principles of Bridge Resource Management:

a) Allocation, Assignment and Prioritization of resources

b) Assertiveness and Leadership

GOVERNMENT OF INDIA

PM Paper

Date: - 7th Mar-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) What is Magnetic variation, why it varies, and where you will find its value?
b) Write short notes on Drifting and Tilting of a free Gyroscope.

Q.2 a) Explain the principle and the errors of EM Log.
b) Describe Janus Configuration.

Q.3 With respect to GPS, write short notes on:
a) Space segment & Ground control segment.
b) What is a clock-bias error?

Q.4 a) What are the various errors of a sextant and how will you correct them?
b) What are the information that is stored in the VDR?

Q.5 Describe various duties, precautions, and actions to be taken by the OOW when navigating with a pilot onboard.

Q.6 a) Describe the role of MRCC and RCC in a Marine rescue operation.
b) How does the VTS contribute to the safety of navigation?

Q.7 With respect to bridge resource management principles, explain the following:
a) Effective communication
b) Situational Awareness
c) Assertiveness & Leadership

Q.8 a) How will you draw the swinging circle on anchoring? Describe the steps to be taken when you find the vessel's position is outside the swinging circle?
b) Draw out a Checklist for anchoring.

Q.9 Write short notes on the following with regards to maneuvering:
a) Pivot point
b) Transverse thrust
c) Drift angle
d) Bridge Resource Management (BRM).

GOVERNMENT OF INDIA

PM Paper

Date: - 7th Jan-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 Explain the principle of ROTI with a block diagram.

Q.2 a) Explain the errors associated with working of Echosounder.

b) Explain how does a Janus Configuration help to minimize the error of log speed of the vessel.

Q.3 a) What do you understand by WGS84 chart datum.

b) What cautions are to be exerted while using GPS.

Q.4 a) Detail about AIS and the data AIS provides, what are the precautions while using alarms in AIS.

b) How is the communication done with another vessel using AIS?

Q.5 With respect to IAMSAR manual, describe what actions you will take when RCC informs you of abandoned craft about 100 miles away from your route.

Q.6 a) What are the responsibilities of the bridge team when the pilot is on board?

b) What is the need for "Master / Pilot Exchange"?

Q.7 Describe the interaction between ships in different situations while passing close by.

Q.8 a) What factors will you consider in choosing a safe anchorage for your ship?

b) List out various methods by which you can determine, if the vessel is dragging anchor or not.

Q.9 What is VTS and its purpose? What are the differences between VTIS and VTMS?

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GOVERNMENT OF INDIA

AM Paper

Date: - 7th Jan-2025

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) Detail the working principles of both gyro and magnetic compasses.
b) What all errors are possible on both gyro and magnetic compasses?

Q.2 Explain with block diagram the principle of electromagnetic log and the limitations of same.

Q.3 a) What do you understand by WGS84 chart datum?
b) What cautions are to be exerted while using GPS.

Q.4 a) Explain with a block diagram, the functioning of VDR.
b) What equipment's are connected to VDR & how will you download data from VDR in case of an accident.

Q.5 Write short notes on:
a) Pivot point
b) Transverse thrust
c) Bank effect
d) Drift angle

Q.6 a) What are the responsibilities of the bridge team when the pilot is on board?
b) What is the need for "Master / Pilot Exchange"?

Q.7 Describe the interaction between ships in different situations while passing close by.

Q.8 a) What is a "Sole lookout as per STCW"?
b) In what all circumstances will you call for assistance.
c) How will you ensure that assistance will be immediately available if needed?

Q.9 You hear a fire alarm from the vicinity of laundry room at night while on night watch. Prepare a checklist for the actions required.

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GOVERNMENT OF INDIA

PM Paper

Date: - 6th Nov-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 With respect to GPS briefly explain the following:

- | | |
|--------------------------------|--------------------------------------|
| a) Precise Positioning Service | b) Service Positioning Service |
| c) Pseudo Range | d) Geometric Dilution of Precession. |

Q.2 a) What is a free gyroscope? What are two properties of a gyroscope?

b) Explain the following with regards to Adaptive autopilot?

- | | | |
|-------------------------|------------------------|-----------------------|
| i) Proportional Control | ii) Derivative Control | iii) Integral Control |
|-------------------------|------------------------|-----------------------|

Q.3 Explain Rule 6 Safe Speed as per COLREGS.

Q.4 Explain the importance of Bridge Resource Management on board & factors that affect the effective use of BRM. Illustrate with on board situation.

Q.5 a) What factors would you consider in deciding the anchor position and amount of cable to use.

- | | | |
|---|-----------------------|------------------|
| b) Write short notes on: i) Pivot point | ii) Transverse thrust | iii) Drift Angle |
|---|-----------------------|------------------|

Q.6 a) Describe the principle and working of a Doppler Log.

b) With respect to Echo sounder, explain the effect of density, temperature and pressure on the depth indicated.

Q.7 a) Describe the procedure for testing of controls prior departure from port.

b) State the circumstances under which you will call the master.

Q.8 a) What is the purpose of IAMSAR? Explain the duties & responsibilities of the On-scene Coordinator.

b) State the objectives and limitations of the VTS system.

Q.9 a) Explain how the automatic identification systems work?

b) List the data required to be recorded by a voyage data recorder.

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GOVERNMENT OF INDIA

AM Paper

Date: - 6th Nov-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

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Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) Describe the principle and working of a Doppler Log. List the main error sources of Doppler log.
b) Differentiate between ground reference speed and water reference speed.

Q.2 a) What is the principle of Automatic Identification System? What are the advantages of AIS?
b) Write a short note on VDR.

Q.3 What are the contents of the Bridge Procedures Guide. Briefly describe each section of the guide.

Q.4 a) How will you know your vessel is dragging anchor?
b) Your vessel is at anchor, how will you take over your watch.

Q.5 With simple diagram, describe briefly:
a) With respect to stopping distance, explain head reach and track reach.
b) Williamson Turn.

Q.6 a) Your vessel ran aground, enumerate the action to be taken.
b) Describe the immediate actions to be taken in case of steering failure.

Q.7 a) State the STCW guidelines for ensuring a safe and efficient bridge watch.
b) List out the various publications and manuals you would require for safe navigation.

Q.8 a) Describe the use of VTS in navigation.
b) Describe the essential elements of Ship Reporting System and the types of reports to be made by the vessel.

Q.9 Your vessel is transiting a river, describe various interactions your vessel will have with:
a) Anchor passing vessel b) Sea bed c) River bank

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GOVERNMENT OF INDIA

AM Paper

Date: - 4th Sept-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 Explain the principle of ROTI with a block diagram.

Q.2 Explain with block diagram principle of Doppler log and the limitations of same.

Q.3 a) Explain various GPS systems currently in use and which all countries they belong to and their position accuracy in meters.

b) What do you understand by 'Pseudo range' & 'True range'.

Q.4 a) Detail about AIS and the data AIS provides. What are the precautions while using alarms in AIS.

b) How is the communication done with another vessel using AIS.

Q.5 a) What are the publications and manuals you require for the safe conduct of navigation?

b) What is IAMSAR? What is its use on board.

Q.6 What are the different bridge manning levels? How will you take over watch as an OOW when pilotage is progress?

Q.7 Describe the interaction between ships in different situation while passing close by.

Q.8 a) What factors will you consider in choosing a safe anchorage for your ship?

b) List out various methods by which you can determine, if the vessel is dragging anchor or not.

Q.9 What is VTS and its purpose? What are the differences between VTIS and VTMS?

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

GOVERNMENT OF INDIA

PM Paper

Date: - 4th Sept-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 Explain what modifications are made to the free gyroscope and how it helps to eventually behave like north seeking gyro compass.

Q.2 Explain the working of echo sounder with respect to phasing technique. What precaution must be exercised whilst using phasing technique?

Q.3 With regards to GPS, why do we require 3 satellites for a 2-dimensional fix. What action will you take if you find the navigation chart in use is not based on WGS84?

Q.4 Write notes on the following:

- a) Various modules of VDR
- b) Difference between AIS & LRIT.

Q.5 Describe in brief the contents of the "Bridge Procedure Guide".

Q.6 a) Describe the use of VTS in navigation.

b) Describe the essential elements of Ship Reporting System and the types of reports to be made by the vessels.

Q.7 a) With respect to GPS. Explain the following:

- i) Space segment and Ground segment
 - ii) What factors affect the accuracy of a GPS positions.
- b)** Explain the difference between Raster and Vector Charts.

Q.8) Discuss your actions in the following emergencies:

- a) Man-overboard in restricted visibility
- b) Fire in pump-room of tanker in port.

Q.9 With regards to Gyro Compass, briefly explain

- i) Precession of the axis
- ii) Drift and tilt
- iii) Procedure to determine the compass error.

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GOVERNMENT OF INDIA

PM Paper

Date: - 7th May-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 Explain the principle of ROTI with a block diagram.

Q.2 Explain with block diagram principle of Doppler log and the limitations of same.

- Q.3** a) What do you understand by WGS84 chart datum.
b) What cautions are to be exerted while using GPS?

- Q.4** a) Detail about AIS and the data AIS provides what are the precautions while using alarms in AIS.
b) How is the communication done with another vessel using AIS.

- Q.5** a) What are the publications and manuals you require for the safe conduct of navigation?
b) What is IAMSAR? What is its use on board?

- Q.6** a) What are the responsibilities of the bridge team when the pilot is on board?
b) What is the need for "Master / Pilot Exchange"?

Q.7 Describe the interaction between ships in different situation while passing close by.

- Q.8)** a) What factors will you consider in choosing a safe anchorage for your ship?
b) List out various methods by which you can determine, if the vessel is dragging anchor or not.

Q.9 What is VTS and its purpose? What is the difference between VTIS and VTMS?

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GOVERNMENT OF INDIA

AM Paper

Date: - 7th May-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

- Q.1** a) Explain the magnetism of the Earth with a suitable sketch.
b) Briefly describe the working of follow-up and non-follow-up steering controls including change-over procedures.
- Q.2** Write short notes on: a) Electro-Magnetic Log b) Janus Configuration c) SVDR
- Q.3** a) Explain “Navigation Message” and “Dilution of Precision” with respect to GPS.
b) Describe the use of AIS to enhance the safety of navigation and in collision avoidance.
- Q.4** a) What information is transmitted by the LRIT and who are the authorized receivers?
b) Describe the working of the BNWAS.
- Q.5** a) Describe the contents of the Bridge Procedure Guide.
b) Describe the test routines for steering gear as required by regulations.
- Q.6** Describe with sketches any two search patterns as per IAMSAR volume III Indicating the situations which to apply.
- Q.7** a) Explain the requirements for rest hours and how you will comply as an OOW.
b) Explain situational awareness with regard to bridge watch keeping.
- Q.8** a) Prepare a checklist for the OOW for handing over of navigation watch.
b) List the circumstances when the OOW navigation needs to call the master.
- Q.9** a) Define “Squat” and “Shallow Water”. What are the indications of shallow water?
b) Explain head reach, track reach and turning circle with a simple sketch.

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GOVERNMENT OF INDIA

AM Paper

Date: - 7th Mar-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

- Q.1** a) Explain the magnetism of the Earth with a suitable sketch. (10 Marks)
b) Briefly describe the working of follow-up and non-follow-up steering controls change-over procedures. (15 Marks)
- Q.2** Write short notes on: a) Electro-Magnetic Log b) Janus Configuration c) SVDR
- Q.3** a) Explain “Navigation Message” and “Dilution of Precision” with respect to GPS. (10 Marks)
b) Explain working of a DGPS. (15 Marks)
- Q.4** a) Explain the working of LRIT and information transmitted. Who are the authorized receivers of the information? (10 Marks)
b) Describe the working of the BNWAS. (15 Marks)
- Q.5** a) List the contents of the Bridge Procedure Guide. (15 Marks)
b) What are the test routines for steering gear as required by SOLAS regulations? (05 Marks)
c) How will you carry out a test for a SART? (05 Marks)
- Q.6** Describe with sketches any two search patterns as per of IAMSAR volume III and state the situations in which you will execute. (25 Marks)
- Q.7** a) Explain the requirements for rest hours as per STCW 2010 amendments (10 Marks)
b) Explain the term situational awareness when keeping a navigational watch. (15 Marks)
- Q.8** a) Prepare a checklist for the OOW for handing over of navigation watch. (15 Marks)
b) List the circumstances when the OOW navigation needs to call the master. (10 Marks)
- Q.9** a) Define “Squat” and “Shallow Water”. What are the indications of shallow water? (10 Marks)
b) Explain head reach, track reach and turning circle with a simple sketch. (15 Marks)

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

GOVERNMENT OF INDIA

PM Paper

Date: - 7th Mar-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) With reference to a Gyro compass, explain the following:

- i) Gyroscopic Inertia ii) Drift iii) Tilt

b) Show with a help of a neat sketch how Rate of Turn is determined.

Q.2 a) Neatly sketch and label a Magnetic Compass Binnacle with all the correctors.

b) Explain the purpose of VDR. List the data recorded in a S-VDR/VDR.

Q.3 State the performance requirements of Bridge Navigation Watch Alarm System (detail the alarm sequence, operation modes, power requirement etc).

Q.4 a) Briefly explain the following w.r.t. GPS:

- i) DOP ii) Contents of the Navigational message?

b) What are the advantages and disadvantages of ECDIS.

Q.5 Write short notes on the following:

- a) Pivot point b) Transverse thrust c) Bank Effect

Q.6 a) Describe the various duties of the OOW when navigating with pilot on board.

b) What is the information contained in the Pilot Card?

Q.7 What is IAMSAR? Sketch and describe 3 search patterns as per IAMSAR?

Q.8 a) Describe the duties of an officer in-charge of a Navigational Watch while taking over a watch in coastal waters.

b) As an OOW, what would be your actions on encountering restricted visibility?

Q.9 a) As per the Bridge Procedure guide, when should the Master be called to the bridge?

b) What is pivot point? Show with sketches where would be the pivot point for a vessel making headway, sternway and stopped.

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

GOVERNMENT OF INDIA

PM Paper

Date: - 4th Jan-2024

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) How does Proportional Control work and how does the addition of Integral and Derivative control in an Auto-Pilot improve steering control.

b) Explain off course Alarm, Rudder limit alarm & Weather controls in Autopilot.

Q.2 a) In a Master Echo Sounder, Describe:

- i) Pythagoras Error and how it is computed?
- ii) Cross Noise, Thermal Noise, Sea Noise
- iii) Multiple Echoes

b) With a simple, clearly labelled sketch, describe how an EM Log displays speed and distance.

Q.3 With reference to GPS explain:

- i) C/A code
- ii) Navigational message
- iii) GDOP

Q.4 With respect to AIS explain the following:

- a) Purpose and benefit of AIS
- b) Why AIS cannot be used for collision avoidance
- c) Dynamic message
- d) Limitation of AIS

Q.5 a) Explain with a neat sketch the use of Double Parallel indexing method to keep vessel on charted course.

b) What are the advantages and disadvantages of the VTS system?

Q.6 a) Write notes on:

- i) Search & Rescue Co-ordinators (SCs)
- ii) Search & Rescue Region (SRR)

b) Describe with suitable sketch following search patterns as per IAMSAR.

- i) Expanding square search
- ii) Sector search

Q.7 a) List the exchange of information between the Master and Pilot when the Pilot boards the vessel.

b) What information is contained in the Wheel House poster and how does it help the navigator.

Q.8) While keeping Bridge watch at Sea what action will you take when following alarms are activated

- a) Steering alarm
- b) Man overboard
- c) Fire alarm

Q.9 a) Why is the turning circle of a ship larger when in shallow water? (Marks 10)

b) What would be the effect of wind from the Port beam, on a Car Carrier that is:

- i) Stopped and drifting
 - ii) moving ahead
 - iii) Moving astern
- (Marks 15)

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

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) How does Proportional Control Work and how does the addition of Integral and Derivation control in an Auto Pilot improve steering control.

b) Explain off course Alarm, Rudder limit alarm & weather controls in Autopilot.

Q.2 a) In a Marine Echo Sounder, Describe:

- i) Pythagoras Error and how it is computed?
- ii) Cross Noise, Thermal Noise, Sea Noise.
- iii) Multiple Echoes.

b) With a simple, clearly labelled sketch, describe how an EM Log displays speed and distance.

Q.3 With reference to GPS explain:

- i) C/A code
- ii) Navigational message
- iii) GDOP

Q.4 With respect to AIS explain the following:

- a) Purpose and benefits of AIS.
- b) Why AIS cannot be used for collision avoidance.
- c) Dynamic message
- d) Limitation of AIS.

Q.5 a) Explain with a neat sketch the use of Double Parallel indexing method to keep vessel on charted course.

b) What are the advantages and disadvantages of the VTS system?

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- i) Search & Rescue Coordinator (SCs)
 - ii) Search & Rescue region (SRR)
- b) Describe with suitable sketch following search patterns as per IAMSAR:
- i) Expanding square search
 - ii) Sector search

Q.7 a) List the exchange of information between the Master and Pilot when the Pilot boards the vessel.

b) What information is contained in the Wheel House poster and how does it help the navigator.

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- a) Steering alarm
- b) Man overboard
- c) Fire alarm

Q.9 a) Why is the turning circle of a ship larger when in shallow water?

b) What would be the effect of wind from the Port beam, on a Car carrier that is:

- i) Stopped and drifting
- ii) moving ahead
- iii) Moving astern

GOVERNMENT OF INDIA

PM Paper

Date: - 14th Nov-2023

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 Explain with appropriate diagram for a Magnetic compass:

- a) Earth's magnetic field
- b) Magnetic elements
- c) Changes in magnetic elements

Q.2 a) Describe Autopilot as an aid to navigation?

b) Explain Off course Alarm, Rudder limit alarm & Weather controls in Autopilot.

Q.3 a) Differentiate between AIS & LRIT.

b) How is GPS used to determine ship's position?

Q.4 a) Explain function of VDR & SVDR.

b) Explain working of Doppler Log.

Q.5 a) Draw and label the stockless anchor used on vessels. (10 marks)

b) Explain when you will suspect that anchor is dragging. (8 marks)

c) As OOW what actions you will take if anchor is dragging. (7 marks)

Q.6 Explain the following:

a) What are the circumstances in which OOW should call master. (10 marks)

b) As per STCW when will OOW be a sole lookout on bridge (6 marks)

c) State your actions in case your vessel runs aground? (9 marks)

Q.7 a) With a neat sketch describe sector search pattern in IAMSAR.

b) Your vessel is heading 270^oT, you are on bridge keeping watch. A seaman falls overboard on port side. State your action till retrieval of seaman from water.

Q.8) a) With proper sketch show the following:

i) Track reach & head reach

ii) Transverse Thrust

b) Explain the contents of Bridge poster.

Q.9 Explain the objective of Vessel traffic service (VTS) system in use. Discuss the various methods used by the VTS to enhance safety and efficacy of Navigation.

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

GOVERNMENT OF INDIA

AM Paper

Date: - 14th Nov-2023

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) Detail the working principles of both gyro and magnetic compasses.
b) What all errors are possible on both gyro and magnetic compasses.

Q.2 Explain with block diagram the principle of electromagnetic log and the limitations of same.

Q.3 a) Explain various GPS systems currently in use and which all countries they belong to and their position accuracy in meters.
b) What do you understand by "Pseudo Range" & "True range".

Q.4 a) Explain with a block diagram, the functioning of VDR.
b) What equipment's are connected to VDR & how will you download data from VDR in case of an accident.

Q.5 Write short notes on:
a) Pivot Point b) Transverse thrust c) Bank effect d) Drift angle.

Q.6 What are the different bridge manning levels? How will you take over watch as an OOW when pilotage is progress?

Q.7 Describe the interaction between ships in different situation while passing close by.

Q.8) a) What is a "Sole lookout as per STCW"?
b) In what all circumstances will you call for assistance.
c) How will you ensure that assistance will be immediately available if needed?

Q.9 You hear a fire alarm from the vicinity of laundry room at night while on night watch. Prepare a check list for the actions required.

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

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions.

Q.1 a) Draw a neat sketch of compass binnacle and label various arrangements provided in it.
b) How will you plan a turn around an imaginary point? Describe the methods of execution and monitoring of the turn keeping Rate of Turn constant?

Q.2 a) Explain the operational and functional performance requirements of a Bridge Navigation Watch Alarm System.
b) What are the problems encountered in “ranging” method of the echo sounder? How is it minimized by “phasing” method?

Q.3 i) Describe the term GNSS.
ii) What is the difference between 3D position and 2D position?
iii) How does DGPS improve the accuracy of a normal GPS fix?

Q.4 What do you understand by the term ‘chart datum’? Which default datum is used in GPS? Can a fix obtained from the GPS receiver be plotted directly onto a navigational chart?

Q.5 Briefly discuss the contents of the Bridge Procedure Guide (BPG). What does the Guide say regarding:
i) Bridge familiarization and ii) ‘Standing Orders’ by the master?

Q.6 a) State the general principle and reporting procedures of the Ship Reporting System.
b) State the advantages and disadvantages of the following MOB patterns: -
i) Williamson Turn
ii) Scharnov Turn and
iii) Anderson Turn

Q.7 As an OOW for safe & efficient “completion of voyage you need to keep same principles of BRM in mind. ”Discuss of BRM in mind.” Discuss the above statement with on board situation.

Q.8 a) List the immediate and subsequent actions that you will take in the event of M/E failure in a TSS.
b) As per the STCW 2010 Watch Keeping Standards, how will you take over an anchor watch at night in a congested anchorage?

Q.9 a) Define ‘Squat’. State the factors that affect the amount of squat.
b) What is the effect on a vessel moving close to a solid wall or bank? Explain with neat sketches.

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. All Questions carry equal marks i.e. 25 marks each.
2. Attempt any 8 out of the 9 questions

Q.1 How will you adjust various controls on PID auto pilot for optimum performance?

Q.2 In case of Doppler log, why do we require Janus configuration? What is use of dual axis configuration?

Q.3 What are various segments of GPS? Explain regarding working of DGPS.

Q.4 Write notes on the following:

- i) LRIT
- ii) AIS

Q.5 a) Describe the procedure for taking over navigational watch at night.

b) Describe the actions to be taken upon receiving storm warnings & distress alert.

Q.6 a) How will you prepare the vessel for picking up survivors while approaching towards a location of distress?

b) What are the various search patterns as per IAMSAR?

Q.7 a) Describe the duties of the officer on Watch when the vessel is at anchor in a congested anchorage.

b) How will you effectively use the various resource such as Navigational equipment on the Bridge and available manpower for keeping a safe navigation watch at sea based on the principles of Bridge Resource Management?

Q.8) a) How will you handover a navigational watch at night in restricted visibility?

b) What entries are to be made in deck log book when you handover a navigational watch?

Q.9 Briefly describe the following: -

- a) Smelling the ground
- b) Girding of Tug
- c) Transverse thrust
- d) Bank Suction
- e) Track Reach

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

GOVERNMENT OF INDIA

Paper – 1

Date: - 4th May-2023

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Start writing the answer to each question on a fresh page. Use clear presentation with sketches.
2. All Questions carry equal marks i.e. 25 marks each.
3. Attempt any 8 out of the 9 questions

Q.1 a) With respect to Gyro Compass describe.

- | | | | |
|--|-----------|-----------|------------|
| i) Precession | ii) Drift | iii) Tilt | (15 Marks) |
| b) How is Gyro Compass made North Seeking. | | | (10 Marks) |

Q.2 a) With reference to GPS write short notes on:

- | | | | |
|---|------------------------|---------------|------------|
| i) C.A. Code | ii) Navigation Message | iii) PPS code | (15 Marks) |
| b) List the errors associated with GPS obtained position. | | | (10 Marks) |

Q.3 a) Explain the errors associated with a marine echo sounder.

(15 Marks)

b) Explain how a Doppler log determines the speed of the ship.

(10 Marks)

Q.4 a) Compare and contrast between Automatic Identification of Ship and Long range Identification and Tracking System.

(15 Marks)

b) Describe briefly the working of Bridge Navigational Watch Alarm System.

(10 Marks)

Q.5 List the duties, actions and precautions to be taken as OOW, while your vessel is navigating in restricted visibility.

(25 Marks)

Q.6 Describe actions you will initiate as an OOW in case of "Fire in the pump room while at anchor".

(25 Marks)

Q.7 Explain the following SAR patterns.

- | | | |
|------------------|---|------------|
| a) Sector search | b) Co-ordinated ship and Aircraft search pattern. | (25 Marks) |
|------------------|---|------------|

Q.8) What are the advantages of Bridge Resource Management (BRM)? How will you use the principles of BRM while navigating in congested waters.

(25 Marks)

Q.9 Write short notes on the following:

a) Describe the Pivot point of the vessel and how the Pivot point changes during manouvering of the ship.

(10 Marks)

b) The factors on which the stopping distance of a vessel depends? How does a stopping distance of a vessel vary in shallow waters.

(15 Marks)

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

GOVERNMENT OF INDIA

Paper – 2

Date: - 4th May-2023

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 List the occasions: -

- i) When Full correction of the magnetic compass is necessary, and
- ii) When a tentative adjustment is necessary.

Q.2 With the help of a simple block diagram explain the working of the Echo Sounder and explain its errors.

Q.3 Write short notes on the following: -

- | | |
|---------------------|-------------------------|
| i) Pseudo Range | ii) P-Code and C/A code |
| iii) Ground segment | iv) Space segment |

Q.4 Explain the working of AIS and LRIT. Explain the difference between the two.

Q.5 What action will you take when you observe the following:-

- i) Own ship dragging anchor and drifting onto another vessel.
- ii) Steering failure alarm gets activated.
- iii) You see an AB falling overboard on the forecastle on the starboard side.

Q.6 a) Describe with sketches various search patterns used in SAR.

b) What are the duties and responsibilities of OSC?

Q.7 a) What are the contents of a "Pilot Card" and why it is useful to have a Master-Pilot information exchange?

b) What are your duties and responsibilities as OOW on bridge at the time when a pilot is on-board.

Q.8) State your action as an OOW if there is fire in the pump room of an oil tanker while discharging is going on.

Q.9 What do you mean by "Squat"? Explain the effects of shallow water on manoeuvring.

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

GOVERNMENT OF INDIA

Paper – 2

Date: - 6th March-2023

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) How is the magnetic compass bowl maintained horizontal in seaway? When do you need to prepare a new compass deviation card?

b) Briefly describe the working of proportional, integral and derivative controls for autopilot.

Q.2 Explain the errors of a) Doppler Log and b) Echo Sounder.

Q.3 Describe the working principle of GPS with a sketch showing the 3 segments. List the limitations of the satellite positioning system.

Q.4 a) Compare AIS and LRIT.

b) Compare ENC and RNC.

Q.5 Explain in detail the “Responsibilities” of an Officer in Charge of Navigation Watch with reference to COLREGs, STCW and Bridge Procedures Guide.

Q.6 List the actions required of an officer of navigational watch in case of receipt of a distress alert. List the duties of On-scene Coordinator.

Q.7 a) Explain “Restricted Visibility” and the precaution required for navigation in restricted visibility.

b) Describe the duties of an officer of the navigational watch during pilotage.

Q.8) a) Discuss minimum UKC requirements for passage planning and it can be complied.

b) What is scope of the anchor chain? Show with sketch how you can draw a swinging circle at anchor and how you will decide the anchor dragging alarm.

Q.9 a) Define the terms used in a Turning Circle Diagram with a neat sketch.

b) Describe bank effect with neat sketches.

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

GOVERNMENT OF INDIA

Paper – 1

Date: - 6th March-2023

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 Explain what modifications are made to the free gyroscope and how it helps to eventually behave like north seeking gyro compass.

Q.2 Explain the working of Echo sounder with respect to phasing technique. What precaution must be exercised whilst using phasing technique?

Q.3 With regards to GPS, why do we require 3 satellites for a 2-dimensional fix. What action will you take if you find the navigation chart in use is not based on WGS84?

Q.4 Write notes on the following:
a) Various modules of VDR.
b) Difference between AIS & LRIT.

Q.5 Describe in brief the contents of the “Bridge Procedures Guide”.

Q.6 a) Describe the use of VTS in navigation.
b) Describe the essential elements of Ship Reporting System and the types of reports to be made by the vessels.

Q.7 a) State the STCW guidelines for ensuring a safe and efficient bridge watch.
b) List out the various publications and manuals you would require for safe navigation.

Q.8) Discuss your actions in the following emergencies:
a) Man-overboard in restricted visibility.
b) Fire in pump-room of tanker in port.

Q.9 Your vessel is transiting a river, describe various interactions your vessel will have with:
a) Another passing vessel b) Sea bed c) River Bank

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

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Start writing the answer to each question on a fresh page. Use clear presentation with sketches.
2. Attempt any Eight Questions out of Nine Equations.
3. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) Explain the working of an Auto Pilot and various setting of the auto Pilot for optimal performance. (15 marks)

b) What are the various methods to monitor a radial turn? (10 marks)

Q.2 a) Explain with the aid of block diagram the working of an Echo Sounder.

b) Describe the errors associated with Echo Sounder.

Q.3 Explain briefly with respect to AIS:

a) Functioning

b) Limitations

c) Types of messages (25 marks)

Q.4 a) What are the various errors of sextant and how will you correct them? (15 Marks)

b) What are the information that is stored in the VDR? (10 Marks)

Q.5 Describe the actions you as an OOW will take when man falls overboard in open sea and in extreme cold conditions. (25 Marks)

Q.6 a) Describe the role of MRCC and RCC in a Marine rescue operation. (10 marks)

b) How does the VTS contributes to the safety of navigation?

Q.7 Explain your action as a watch keeping officer under following cases:

a) Unmarked navigational mark sighted

b) Encounter restricted visibility.

Q.8) With the help of a suitable diagram explain the following terms:

a) Transfer

b) Head Reach

c) Tactical diameter

d) Advance

Q.9 Briefly explain the following, with reference to the Principles of Bridge Resource Management:

a) Allocation, Assignment and prioritization of resources

b) Assertiveness and leadership.

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) What is Magnetic variation, why it varies and where you will find its value?
b) Write short notes on Drifting and Tilting of a free Gyroscope?

Q.2 a) Explain the principle and the errors of EM Log.
b) Describe Janus Configuration.

Q.3 With respect to GPS write short notes on:
a) Space segment & Ground control segment
b) What is a clock-bias error?

Q.4 Differentiate between the following:
a) AIS and LRIT
b) VDR and S-VDR

Q.5 Describe various duties, precautions and actions to be taken by the OOW when navigating with pilot on board.

Q.6 a) What is VTS and what are the benefits of implementing VTS?
b) Describe with suitable sketch following search patterns as per IAMSAR.
i) Expanding Square Search
ii) Sector Search

Q.7 With respect to bridge resource management principles explain the following:
a) Effective communication
b) Assertiveness & Leadership
c) Situational Awareness

Q.8 a) How will you draw the swinging circle on anchoring? Describe the steps to be taken when you find the vessel's position is outside the swinging circle?
b) Draw out a Checklist for Anchoring.

Q.9 Write short notes on the following with regards to maneuvering: -
a) Pivot point
b) Transverse thrust
c) Drift angle
d) Bridge Resource Management (BRM)

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) State the principle of Doppler log and explain how the principle is used to determine the ships speed.

b) Describe the purpose and performance requirement of BNWAS.

Q.2 a) Show with a neat sketch how will you execute a constant Radial turn.

b) Differentiate between AIS & LRIT.

Q.3 a) With respect to GPS explain:

- i) GDOP ii) C/A code iii) Carrier frequency

b) Explain how DGPS enhances the accuracy of a GPS receiver.

Q.4 Explain the following:

a) Purpose of LRIT

b) Data transmitted by LRIT

c) Authorised receivers / Users of LRIT

d) Functions of LRIT National Data Centre.

Q.5 Describe in brief the contents of "Bridge Procedures Guide".

Q.6 a) Describe the use of VTS in Navigation.

b) Describe the essential elements of Ship Reporting System and the types of reports to be sent by vessel.

Q.7 A new life raft which had been delivered on board on vessels sailing was to be secured in place. On trying to place the liferaft on the cradle the crew member reported the liferaft has accidentally fallen off from your vessel due to vessel rolling. The painter was not yet connected. Explain your action in retrieving the liferaft from the water if the information is reported immediately after it has fallen in the water? What turn will you use and why?

Q.8) a) What is situational awareness & what are the problems?

b) Explain Communication & state why communication is important when you are sailing with crew from different Nationalities?

Q.9 Draw & label the turning circle diagram of a vessel with Right-Handed Propulsion system. Explain transfer, tactical diameter and drift angle.

GOVERNMENT OF INDIA

Date: - 5th Aug-2022

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) Briefly explain the advantage of an Autopilot and the controls provided for its optimum performance.

b) Explain the use of rate of turn indicator.

Q.2 a) Explain the principle and working of Doppler log for obtaining the speed of a vessel.

b) Briefly explain the various modules of a VDR.

Q.3 Explain following with respect to GYRO.

i) Drift & Tilt

ii) Settling error

iii) Steaming error

iv) Precession

Q.4 a) Explain the difference AIS and LRIT.

b) Explain the purpose of VDR, list the data recorded on VDDR / S-VDR.

Q.5 Your vessel, an oil tanker, suffers fire in the pump room while at anchor. Explain your actions in detail with the help of a suitable checklist.

Q.6 Define 'Emergency'. How does SOLAS ensure that ship's crew can deal with various emergencies that may arise? Describe how this was achieved on your last ship?

Q.7 Describe in detail the duties of a OOW when your vessel an Oil Tanker has run aground.

Q.8) With simple diagrams, describe briefly:

a) Maneuvering data displayed on the Bridge.

b) Williamson turn.

Q.9 Write short notes on following:

a) Transverse Thrust

b) Squat

c) Bow cushion and Bulk suction

d) Interaction between Vessels.

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

GOVERNMENT OF INDIA

Date: - 7th July-2022

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) Describe the principle and working of a Doppler Log. List the main error sources of Doppler log.
b) Differentiate between ground reference speed and water reference speed.

Q.2 a) What is the principle of Automatic Identification System? What are the advantages of AIS?
b) Write a short note on VDR.

Q.3 What are the contents of the Bridge Procedures Guide. Briefly describe each section of the guide.

Q.4 a) How will you know your vessel is dragging anchor?
b) Your vessel is at anchor, how will you take over your watch?

Q.5 With simple diagram, describe briefly:
a) With respect to stopping distance, explain head reach and track reach.
b) Williamson Turn.

Q.6 a) Your vessel ran aground, enumerate the action to be taken.
b) Describe the immediate actions to be taken in case of steering failure.

Q.7 a) With respect to GPS Explain the following:
i) Space segment and Ground segment.
ii) What factors affect the accuracy of a GPS positions.
b) Explain the difference between Raster and Vector Charts.

Q.8 a) What is the purpose of IAMSAR? Explain the duties & responsibilities of the On-scene Co-Ordinator.
b) State the objectives and limitations of the VTS system.

Q.9 With regards to Gyro compass, briefly explain
i) Precession of the axis ii) Drift and Tilt iii) Procedure to determine the compass error.

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

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) Describe Auto Pilot as an aid to navigation.

b) Explain the purpose & function of following controls:

i) Permanent Helm

ii) Counter Rudder

iii) Rudder

iv) Rudder Limit

v) Weather

Q.2 Explain the working of an Electro-magnetic log with a suitable diagram and compare its advantages and disadvantages with Doppler Log.

Q.3 a) How will you initiate GPS on installation.

b) What factors affect the accuracy of GPS position.

c) What do you understand by "Pseudo range" & "True range".

Q.4 Describe the working of an echo sounder with aid of a block diagram. Discuss the various errors associated with echo sounders.

Q.5 Explain your action as Bridge Keeping Officer under following circumstances:

a) Vessel at anchor and commences dragging.

b) Vessel at sea starts encountering gale force winds.

Q.6 With the help of sketch explain all the search patterns as per IAMSAR.

Q.7 a) Explain the factors to be taken into account when determining bridge manning levels.

b) Explain the reporting procedures for VTS and SRS.

Q.8) List out the Watch keepers Responsibility under the following circumstances.

a) Storm warning while vessel at Anchor.

b) Fire on vessel at Berth

Q.9 a) Discuss shallow water effects.

b) Draw the turning Circle Diagram of a Ship. Define the terms used in the turning Circle.

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) What are the advantages of wet compass card over dry compass card? How will you remove an Air Bubble from the compass bowl?

b) What is Dip? How compass card is kept horizontal in varying latitudes?

Q.2 With the help of a suitable diagram, explain the working of an Echo sounder? What are the errors associated with this equipment?

Q.3 How does the GPS find its position? How the DGPS calculate even more accurate position than the GPS?

Q.4 Write short notes on following Equipment:

i) LRIT

ii) VDR

Q.5 Describe the duties of OOW in restricted visibility when:

i) At Anchor

ii) When taking over a navigation watch at sea

Q.6 Explain the sector Pattern with the help of a suitable sketch. Under what circumstances it should be used?

Q.7 a) Describe the Navigational duties and responsibilities of the officer in charge of the navigational watch at sea.

b) Under what circumstances will you call Master on bridge?

Q.8 "Bridge resource management is essential in keeping a safe and efficient watch today". How would you interpret the above statement? Describe your role in the bridge team as an officer in charge of the navigation watch.

Q.9 Write short note on the following:

a) Transverse Thrust

b) Wheel House Poster

c) Squat

d) Bow cushion & Bank suction

GOVERNMENT OF INDIA

Date: - 6th April-2022

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 With respect to GPS briefly explain the following:

- | | |
|--------------------------------|------------------------------------|
| a) Precise Positioning Service | b) Standard Positioning Service |
| c) Pseudo Range | d) Geometric Dilution of Precision |

Q.2 a) What is a free gyroscope? What are two properties of a gyroscope?

b) Explain the following with regards to Adaptive autopilot

- | | | |
|-------------------------|------------------------|-----------------------|
| i) Proportional Control | ii) Derivative Control | iii) Integral Control |
|-------------------------|------------------------|-----------------------|

Q.3 Explain Rule 6 Safe Speed as per COLREGS.

Q.4 Explain the importance of Bridge Resource Management on board & factors that affect the effective use of BRM. Illustrate with on board situation.

Q.5 a) What factors would you consider in deciding the anchor position and amount of cable to use.

- | | | |
|---|------------------------|--------------------|
| b) Write short notes on (i) Pivot Point | (ii) Transverse Thrust | (iii) Drift angle. |
|---|------------------------|--------------------|

Q.6 a) Describe the principle and working of a Doppler Log.

b) With respect to Echo sounder, explain the effect of density, temperature and pressure on the depth indicated.

Q.7 a) Describe the procedure for testing of controls prior departure from port.

b) State the circumstances under which you will call the master.

Q.8) a) Describe the use of VTS in navigation.

b) Describe the essential elements of Ship Reporting System and the types of reports to be made by the vessel.

Q.9 a) Explain how the Automatic Identification systems work?

b) List the data required to be recorded by a voyage data recorder.

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GOVERNMENT OF INDIA

Date: - 7th March-2022

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) Briefly explain the advantage of an Autopilot and the controls provided for its optimum performance. (15 Marks)

b) Explain w.r.t. Gyro Compass the terms 'steaming error' and 'tangent error'. (10 Marks)

Q.2 a) Describe the errors associated with an Echo sounder. (15 Marks)

b) With a simple, clearly labeled sketch, describe how as EM Log displays speed and distance. (10 Marks)

Q.3 a) What are the errors which are likely to be experienced in GPS? (10 Marks)

b) Explain why GPS position cannot be directly plotted on a chart. (10 Marks)

c) What is navigation message? (05 Marks)

Q.4 With respect to AIS explain:

a) In brief the various modes of operation of an AIS (10 Marks)

b) the various types of messages transmitted & its contents (10 Marks)

c) the advantages over RADAR. (05 Marks)

Q.5 Explain your action as Bridge Watch Keeping Officer under following circumstances:

a) Vessel at anchor and commences dragging. (12 Marks)

b) Vessel at sea starts encountering gale force winds. (13 Marks)

Q.6 With the help of sketches, explain all the search patterns as per IAMSAR. (25 Marks)

Q.7 a) What is the Situational Awareness with respect to the Bridge Team? How will you recognize the loss of situational awareness? (15 Marks)

b) Describe the closed loop and open look communications giving relevant examples. (10 Marks)

Q.8) With simple diagrams describe briefly:

a) Maneuvering data displayed on the Bridge. (15 Marks)

b) Williamson turn. (10 Marks)

Q.9 Write short notes on followings:-

i) Render cable and Surge cable (10 Marks)

ii) Pivot Point (05 Marks)

iii) Advance and Transfer while vessel turning (10 Marks)

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

GOVERNMENT OF INDIA

Date: - 4th February-2022

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions out of Nine Equations.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 Describe in detail the immediate and follow up actions of an OOW in case of a fire in engine room while at sea.

Q.2 What are the various search Patterns recommended in the IAMSAR? Explain with sketches.

- Q.3** a) How is the Gyro Compass System made North Seeking?
b) Explain the term latitude course & speed error with respect to the Gyro Compass.

- Q.4** a) With respect to GPS explain the following:
i) System configuration and frequencies used.
ii) Various DOP's used.
iii) Content of navigation message
b) Explain the difference between Raster and Vector charts

- Q.5** With the help of suitable sketch define the following:
a) Transfer b) Advance c) Scope d) Transverse Thrust

- Q.6** a) Explain use of 'Janus' configuration in Doppler log & its use during docking operations.
b) With help of a block diagram explain how ship's speed is transmitted to remote displays.

- Q.7** a) How data is transmitted by the Automatic Identification System?
b) How does it LRIT system function? Compare the AIS & LRIT.

- Q.8)** a) Describe in detail purpose & importance of 'lookout' in keeping a safe bridge watch.
b) What is the role of maintaining situational awareness in safe navigations watch?

- Q.9** Explain your understanding of the following terms:
a) 'safe speed' as per Rule 6 & Rule 19
b) 'Navigate with extreme caution' as per Rule 19

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GOVERNMENT OF INDIA

Date: - 10th January-2022

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions.
2. All Questions carry equal marks i.e. 25 marks each.

- Q.1** a) With respect to marine gyro, define and explain “Rigidity in space”. (Marks 15)
b) Differentiate between:
i) Tilt and Drift ii) Torque and Precision (Marks 10)
- Q.2** a) Describe the principle and functioning of the electrostrictive type of transducer in the echo sounder. (Marks 13)
b) Describe the procedures for the calibration of Doppler log. (Marks 12)
- Q.3** a) State the advantages and disadvantages of Raster and Vector charts. (Marks 13)
b) Describe the contents of navigational message of the GPS. (Marks 12)
- Q.4** a) With the help of sketches show and explain the following with respect to a marine sextant:
i) Dip ii) Refraction iii) True altitude and iv) Sensible horizon (Marks 15)
b) Differentiate between data transmitted by AIS and LRIT. (Marks 10)
- Q.5** a) Briefly discuss the contents of the Bridge Procedure Guide. (Marks 15)
b) What does the guide say regarding: (Marks 10)
i) Bridge familiarization and
ii) ‘Standing Orders’ by the Master.
- Q.6** a) What is the purpose of IAMSAR? Explain the three levels of Co-ordination. (Marks 15)
b) Describe the contents and procedure of the ship reporting system. (Marks 10)
- Q.7** a) “Assertiveness is important for bridge team management”. Justify the above statement. (Marks 13)
b) Prepare a checklist for taking over a watch in restricted visibility. (Marks 12)
- Q.8** a) State the preparation you will make prior to entry into an enclosed space. (Marks 10)
b) List the immediate and subsequent actions that you will take in the event of a steering failure in a TSS. (Marks 15)

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GOVERNMENT OF INDIA

Date: - 03rd December-2021

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions.
2. All Questions carry equal marks i.e. 25 marks each.

- Q.1** a) Write short notes on "Tilt" and "Drift" of a gyro and discuss their rates? (Marks 8)
b) Write short note on Magnetic Compass? (Marks 8)
c) Explain importance of Taking & Recording Compass Error? (Marks 9)
- Q.2** a) Explain the advantages of 'Janus' Configuration in Doppler log. (Marks 15)
b) Enumerate steering gear tests & checks. (Marks 10)
- Q.3** a) Explain the working of a GPS (Marks 15)
b) How does DGPS enhance position fixing of GPS data. (Marks 10)
- Q.4** Write short notes with comparison on the following:
i) LRIT vs AIS
ii) VDR (Voyage Data Recorder) vs S-VDR
iii) ECS (Electronic Chart System) vs Paper Charts
- Q.5** While keeping Bridge watch at sea, list actions would you take when following alarms are activated:
a) Fire Alarm b) Gyro Failure c) VHF DSC Distress Alert
- Q.6** a) List the contents of IAMSAR Volume III. (Marks 15)
b) How does VTS enhance safety of navigation? (Marks 10)
- Q.7** a) Explain Situational Awareness? (Marks 10)
b) Explain terms SAFE SPEED, LOOKOUT, STAND-ON VESSEL. (Marks 15)
- Q.8)** Prepare a checklist for taking over a navigational watch at sea
a) In Restricted Visibility. (Marks 12)
b) Approaching a Heavy Weather Area. (Marks 13)
- Q.9** a) What are the dangers associated with and precautions to take while navigating in shallow waters? (Marks 10)
b) Draw a Turning Circle and Define below mentioned associated Terms ADVANCE, TACTICAL DIAMETER, TRANSFER, DRIFT ANGLE. (Marks 15)

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GOVERNMENT OF INDIA

Date: - 08^h November-2021

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions.
2. All Questions carry equal marks i.e. 25 marks each.

- Q.1** a) Write short notes on “Tilt” and “Drift” of a gyro and discuss their rates? (Marks 8)
b) Write short note on Magnetic Compass? (Marks 8)
c) Explain importance of Taking & Recording Compass Error? (Marks 9)
- Q.2** a) Explain the advantages of ‘Janus’ Configuration of Doppler log. (Marks 15)
b) Enumerate steering gear tests & checks. (Marks 10)
- Q.3** a) Explain the working of a GPS (Marks 15)
b) How does DGPS enhance position fixing of GPS data. (Marks 10)
- Q.4** Write short notes with comparison on the following:
i) LRIT vs AIS
ii) VDR (Voyage Data Recorder) vs S-VDR
iii) ECS (Electronic Chart System) vs Paper Charts
- Q.5** While keeping Bridge watch at sea, list actions would you take when following alarms are activated:
a) Fire Alarm b) Gyro Failure c) VHF DSC Distress Alert
- Q.6** a) List the contents of IAMSAR Volume III. (Marks 15)
b) How does VTS enhance safety of navigation? (Marks 10)
- Q.7** a) Explain Situational Awareness? (Marks 10)
b) Explain terms SAFE SPEED, LOOKOUT, STAND-ON VESSEL. (Marks 15)
- Q.8)** Prepare a checklist for taking over a navigational watch at sea
a) In Restricted Visibility. (Marks 12)
b) Approaching a Heavy Weather Area. (Marks 13)
- Q.9** a) What are the dangers associated with and precautions to take while navigating in shallow waters? (Marks 10)
b) Draw a Turning Circle and Define below mentioned associated Terms ADVANCE, TACTICAL DIAMETER, TRANSFER, DRIFT ANGLE. (Marks 15)

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GOVERNMENT OF INDIA

Date: - 06^h October-2021

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 Explain following terms with respect to Operation of Gyro Compass:

- a) Gyroscopic Inertia
- b) Precession
- c) Tilt
- d) Drift
- e) Three degree of Freedom

Q.2 a) What corrections are to be made to Echo Sounder before comparison with Chart? (Marks 10)

b) Explain the use of 'Janus' configuration in a Doppler log? (Marks 15)

Q.3 a) Write short notes on True North, Magnetic North, Variation, Deviation. (Marks 15)

b) Explain Purpose and Working of a Course Recorder? (Marks 10)

Q.4 Write short notes with on **any two** of the following:

- i) LRIT
- ii) VDR
- iii) ECDIS
- iv) BNWAS
- v) AIS

Q.5 a) Explain Term "**Responsibility**" as per **Rule 2 of Rule of the Road (RoR)**. (Marks 12)

b) Under what conditions and circumstances will you call a Master on the Bridge? (Marks 15)

Q.6 a) List content of IAMSAR Vol 3. (Marks 15)

b) Explain when & how the sector search is executed. (Marks 10)

Q.7 a) What are the dangers associated while navigating in a Heavy Weather Area? (Marks 12)

b) What do you understand by Effective Communication and Assertive Leadership? (Marks 13)

Q.8 a) List actions you will take while on watch and a MOB occurs? (Marks 15)

b) Prepare a checklist for maintaining a Safe Anchor Watch? (Marks 10)

Q.9 a) Define and Explain Terms SQUAT, PIVOT POINT, FOUL HAWSE, BOW CUSHION. (Marks 16)

b) List all the information that you will get from Pilot Card? (Marks 09)

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GOVERNMENT OF INDIA

Date: - 06^h September-2021

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) Describe the procedure for removing air bubble from Magnetic Compass. (Marks 10)

b) With respect to Auto-pilot, write short notes on:

i) Proportional control

ii) Off-course alarm

(Marks 15)

Q.2 How Janus configuration of the Doppler Log minimizes various errors?

Q.3 a) Explain how the frequencies used by GPS satellites can also be used to determine the speed of the vessel? (Marks 15)

b) Explain the methods of updating Electronic Nautical Charts (ENCs). (Marks 10)

Q.4 a) List the authorized users of LRIT information and state the conditions under which LRIT information from ships can be released to the authorized users. (Marks 15)

b) List the data recorded by VDR and SVDR. (Marks 10)

Q.5 a) List the exchange of information between the Master and Pilot when the pilot boards the vessel. (Marks 15)

b) What information is contained in the Wheel House Poster. (Marks 10)

Q.6 List the duties & responsibilities of the On-scene Co-coordinator in IAMSAR.

Q.7 As per STCW watch keeping principles, list the factors to be taken into account when deciding the composition of the watch on bridge.

Q.8) a) What does the STCW say regarding performing a deck watch in general and particularly on ships carrying hazardous cargo? (Marks 10)

b) State your actions on receiving a distress alert on VHF DSC channel 70. (Marks 15)

Q.9 Draw a turning circle for a vessel. Mark and explain Advance, Transfer, Tactical Diameter and Drift Angle.

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

SECOND MATE OF A FOREIGN GOING SHIP

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) How does Proportional control work and how does the addition of Integral and Derivative control in an Auto-Pilot improve steering control. (15 Marks)

b) Describe any two properties of a free gyroscope. (10 Marks)

Q.2 a) Describe the working of a piezo-electric transducer. What is the difference between a piezo-electric and electrostatic transducer? (15 Marks)

b) Briefly describe the effect of Multiple Echoes and 2nd Trace Echoes in an Echo Sounder. (10 Marks)

Q.3 a) What Dilution of Precision? Briefly explain the various types DOP's of the GPS system. (10 Marks)

b) What are the advantages and disadvantages of ECDIS over paper charts? (15 Marks)

Q.4 a) Who are the authorized receivers of LRIT messages and when may they request for the same? What is the function of the DDP? (10 Marks)

b) Why should AIS not be used as the sole anti-collision aid? What is meant by Pseudo-AIS or Virtual-AIS and where could these be used? (15 Marks)

Q.5 a) What is the role of a Pilot on board ship? What is the responsibility of the Bridge Team when a Pilot is on board and what is meant by the term "Challenge the Pilot"? (15 Marks)

b) What is the need for the "Master Pilot Exchange"? (10 Marks)

Q.6 As per IAMSAR describe:

a) The 3 levels of co-ordination indicating the duties and responsibilities at each level. (15 Marks)

b) Contents of Situation Report as per IAMSAR. (10 Marks)

Q.7 a) What is Situational Awareness with respect to the Bridge Team? How will you recognize the loss of situational Awareness? (15 Marks)

b) Describe closed loop and open loop communications giving relevant examples. (10 Marks)

Q.8) What are the immediate and subsequent actions of an OOW in case of a fire that starts in the Engine Room while the vessel is out at sea. Assume you are on a general cargo vessel and the fire gets Out of Control. (25 Marks)

Q.9 a) Sketch and describe the execution of a Short Round Turn for a vessel with a high hand propeller when in restricted waters. (12 Marks)

b) List the factors to be taken into account when allowing for Under Keel Clearance (UKC). (13 Marks)

GOVERNMENT OF INDIA

Date: - 14th July-2021

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight Questions.
2. All Questions carry equal marks i.e. 25 marks each.

Q.1 a) Describe with a simple sketch, the optical system of the Magnetic Compass binnacle. What is the main feature of this system with respect to the image seen by the helmsman. (Marks 15)
b) Define Magnetic Variation and Deviation? (Marks 10)

Q.2 a) Sketch and describe the working of an Electro Magnetic Log. Indicate whether the log shows speed over ground or speed through the water and why. (Marks 15)
b) What are the limitations of the EM log? (Marks 10)

Q.3 a) What are the two methods by which the DGPS system computes the correction to be applied to the position obtained by GPS? (Marks 15)
b) Describe the contents of navigational message of the GPS. (Marks 10)

Q.4 With the respect to AIS explain the following:
a) What are the precautions to be taken when using AIS for collision avoidance and why? (Marks 15)
b) What is the information contained in "Dynamic messages"? (Marks 10)

Q.5 a) Describe how you would take over the navigational watch at night. (Marks 15)
b) Your X-band radar picks up a SART signal. What actions will you take as OOW and how is your vessel expected to respond to this situation? (Marks 10)

Q.6 a) What is the objective of "Ships Routeing"? How will you know whether a routeing system is mandatory or voluntary? (Marks 15)
b) Briefly describe the various reports to be made to shore authorities while participating in ship reporting systems. (Marks 10)

Q.7 a) What is Bridge Resources Management? (Marks 10)
b) What is meant by closed loop communication? How is it advantageous over open loop communication? Give two examples of each type of communication. (Marks 15)

Q.8 a) While on watch, bunker operations are in progress. Should an oil spill occur, what action will you take as OOW? (Marks 15)
b) State your actions on receiving a distress alert on VHF DSC channel 70. (Marks 10)

Q.9 a) Why is the turning circle of a ship larger when in shallow water? (Marks 10)
b) What would be the effect of wind from the Port beam, on a Car Carrier that is:
1) stopped and drifting 2) moving ahead 3) moving astern. (Marks 15)

GOVERNMENT OF INDIA

Date: - 12th April-2021

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks i.e. 25 marks each.

- Q.1** a) With a simple block diagram, describe the working of an Adaptive Auto-Pilot. (10 Marks)
b) Using sketches describe how the following errors of the Gyrocompass are calculated and compensated for: i) Speed & Latitude Error (08 Marks)
ii) Damping or Latitude Error (07 Marks)
- Q.2** a) In a Marine Echo Sounder, Describe (15 Marks)
i) Pythagoras Error and how it is computed?
ii) Cross Noise, Thermal Noise, Sea Noise
iii) Multiple Echoes
b) With a simple, clearly labelled sketch, describe how an EM Log displays speed and distance. (10 Marks)
- Q.3** a) i) What are the contents of the GPS Navigation Message.
ii) Describe the features and function of the Ground Control Segment. (10 Marks)
b) What are the advantages and disadvantages of ENC charts over paper charts. (15 Marks)
- Q.4** a) What is the purpose of the LRIT system? Who are "Authorized Receivers" in the LRIT system? (10 Marks)
b) What is the purpose of the VDR? What data is recorded by SVDR and VDR? (15 Marks)
- Q.5** a) What information is contained in the Wheelhouse Poster? How does it help the Navigator? (15 Marks)
b) Using sketches, describe squat? What is the effect of squat and how can it be reduced. (10 Marks)
- Q.6** a) What is the function of a VTS System? What are the different types of VTS systems? (10 Marks)
b) When are ships required to make reports? Briefly describe the format of reports to be made in a Ship Reporting System? (15 Marks)
- Q.7** a) Briefly describe some of the qualities of a good leader? (10 Marks)
b) i) What are the effects of fatigue ii) Briefly describe Verbal and Non-Verbal communication? (5 + 10 Marks)
- Q.8** As per IAMSAR, sketch and describe three possible recommended turns to be taken in case of a Man Overboard, on the Port side, at sea? What are the preparations to be made while proceeding for the rescue? (25 Marks)
- Q.9** a) Using simple sketches, explain Transverse Thrust in a vessel with a right handed propeller both when going ahead and astern. (10 Marks)
b) Sketch and describe interaction in a narrow channel when one vessel is overtaking another. (15 Marks)

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GOVERNMENT OF INDIA

Date: - 5th March-2021

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks each.

Q.1 What is the principle of auto-pilot steering? What are the different controls provided to improve the efficiency of the system?

Q.2 With the aid of a block diagram, describe the working of an echo-sounder. What are errors in the soundings obtained by echo sounder?

- Q.3** a) What factors affect the accuracy of a GPS position?
b) What do you understand by "Pseudo range" and "True Range?"

Q.4 What are the objectives of AIS? What are the added advantages of AIS over ARPA w.r.t. collision avoidance?

Q.5 Explain the principles of performing navigational watch in different conditions such as clear weather, restricted visibility and in hours of darkness.

- Q.6** a) Write notes on various VTS services provided by shore? Where will you get this information?
b) Enumerate the regulation in COLREGS for stand on vessels?

Q.7 While keeping Bridge watch at sea, what action would you take when following alarms are activated?

- a) Steering Failure Alarm b) Gyro Failure Alarm c) Fire Alarm

Q.8 On a passage from Mumbai to Cochin in the month of August, state all preparations you will make to prepare your vessel for encountering heavy weather?

Q.9 Describe various shallow water effects a vessel experience on entering a narrow channel. How will you describe Squat and calculate it in confined water?

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

GOVERNMENT OF INDIA

Date: - 15th January-2021

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks each.

- Q.1** a) With respect to Gyro Compass explain: (15 Marks)
(i) Precession of the axis (ii) Tilt & Drift (iii) Settling Time
b) Explain why the value of Deviation of a Magnetic Compass changes with change in the heading of the ship? (10 Marks)
- Q.2** a) Explain how an Echo Sounder determines the depth of water? (15 Marks)
b) Explain various errors associated with Doppler Log. (10 Marks)
- Q.3** a) With reference to GPS write short notes on: (15 Marks)
(i) C/A Code (ii) Navigational Message (iii) GDOP
b) State how electronic charts are corrected? (10 Marks)
- Q.4** a) Enumerate various data recorded in VDR. (15 Marks)
b) What is the purpose of LRIT? How does it differ from AIS? (10 Marks)
- Q.5** Explain your understanding of the following terms:
a) 'Safe Speed' as per Rule 6 and Rule 19. (15 Marks)
b) 'Navigate with extreme caution' as per Rule 19. (10 Marks)
- Q.6** a) Enumerate the regulation in COLREGS for stand on vessels? (10 Marks)
b) What are the various search patterns used to assist a vessel in distress? (15 Marks)
- Q.7** a) What are the duties of the O.O.W. when a vessel is at anchor? How will you know your vessel is dragging anchor. (15 Marks)
b) What are the rest periods required for watch keepers as per STCW 2010? (10 Marks)
- Q.8** List out the Watch Keeper's responsibility under the following circumstances:
a) Storm warning while vessel at Anchor.
b) Fire on vessel at Berth. (25 Marks)
- Q.9** Write short notes on the following:
a) Transverse Thrust b) Wheel House Poster
c) Squat d) Bow Cushion & Bank Suction (25 Marks)

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

GOVERNMENT OF INDIA

Date: - 7th December-2020

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks each.

Q.1 a) How will convert a free gyroscope so a gyro compass?
b) Write short notes on precessions of the Gyro?

Q.2 a) Write the principle of Echo Sounder.
b) Explain with block diagram of the operation of Phasing type Echo graph.

Q.3 Write the functions of various segments of GPS. What is Clock-bias error?

Q.4 a) Explain the difference between LRIT and AIS?
b) Explain the working principle of AIS?

Q.5 Describe in brief the contents of "Bridge Procedure Guide".

Q.6 a) Write with diagrams the various types of search pattern in case of Man Overboard.
b) Describe the essential elements of Ship Reporting System.

Q.7 What are the precautions to be taken prior, during and after entering enclosed space?

Q.8 What are the actions to be taken in case of fire in cargo pump room of a crude oil tanker in port and at sea?

Q.9 With simple diagram, describe briefly:-
a) With respect to stopping distance, explain head reach and track reach.
b) List out the various publications and manuals you would require for safe navigation.

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GOVERNMENT OF INDIA

Date: - 13th November-2020

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks each.

Q.1 With respect to a free Gyroscope, briefly explain the following terms:

- a) Gyroscopic Inertia
- b) Precession
- c) Drift and Tilt
- d) Three Degrees of Freedom

Q.2 What is the principle of Electromagnetic log? How is the principle used to find the speed of the vessel?

Q.3 How does the GPS find its position? How the DGPS calculate even more accurate Positions than the GPS.

Q.4 a) Explain the purpose of VDR. List the data recorded on VDR.

b) Compare and contrast between LRIT and AIS.

Q.5 Describe the precautions and actions to be taken on detecting a galley fire while at sea.

Q.6 a) Explain the various routing measures being followed as per 'Ship's Routing guide'.

b) Describe the VTS reporting procedures.

Q.7 a) State the STCW guidelines in ensuring a safe and efficient bridge watch.

b) List out the various publications and manuals you would require for safe navigation.

Q.8 a) State your actions for a person overboard in restricted visibility.

b) As per STCW 2010 watch keeping standards, how will you take over an anchor watch at night in a congested anchorage.

Q.9 With the help of a suitable sketch, explain the following terms:

- a) Transfer
- b) Advance
- c) Tactical diameter
- d) Head Reach

Also, explain the effect on the above aspect of the maneuverability in shallow water.

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GOVERNMENT OF INDIA

Date: - 8th October -2020

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks each.

Q.1 Explain with the help of a block diagram the working of an auto-pilot. On what occasions, should an auto pilot not to be used?

Q.2 What is Doppler Effect? Compare Doppler log and electromagnetic log.

Q.3 Write the segments of GPS in brief. What are the errors in GPS?

Q.4 With respect to AIS explains the followings:

- a) Purpose and benefit of AIS
- b) Why AIS cannot be used for collision avoidance.
- c) Dynamic message
- d) Limitation of AIS

Q.5 a) Describe the various duties of the OOW when navigation with pilot on board.
b) Describe the various actions to be taken by OOW when navigating in coastal waters.

Q.6 a) List the preparations to be carried out on board while enroute for carrying out a rescue operation for a vessel in distress.
b) Write short notes on INSPIRES with respect to Ship Reporting System.

Q.7 a) Describe in detail, the purpose and importance of "Lookout: in keeping a safe bridge watch."
b) List the circumstances in which OOW should call the Master on the Bridge.

Q.8 What are the actions will you take and report to the master if your vessel collides a tanker at sea during your watch?

Q.9 Explain in brief the factors affect the ship maneuvering in narrow channel.

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GOVERNMENT OF INDIA

Date: - 5th March -2020

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks each.

Q.1 a) With simple sketch describe Proportional, Integral and Derivative Control in an Auto-Pilot. **(15 Marks)**

b) Explain the term "Latitude, course and speed error" with respect to the Gyro Compass. **(10 Marks)**

Q.2 a) Describe a principle and working of a Doppler log and explain how Doppler log determines speed of the ship? List the errors of Doppler log. **(15 Marks)**

b) Differentiate between water track speed and ground track speed. **(10 Marks)**

Q.3 What do you understand by the term 'chart datum'? Which default datum is used in GPS? Can a fix obtained from the GPS receiver be plotted directly onto a navigational chart? **(25 Marks)**

Q.4 a) Explain the purpose of VDR and list the data recorded on VDR. **(10 Marks)**

b) Describe the contents and indicate the broadcast intervals for each message type for a class A AIS. **(15 Marks)**

Q.5 a) Describe the various duties of the OOW when navigating with pilot on board. **(15 Marks)**

b) What information is contained in the Pilot Card? **(10 Marks)**

Q.6 As per IAMSAR briefly defines:

- | | | |
|-----------------------------|--------------------------|----------------------|
| i) Track Spacing | ii) Datum | iii) SAR Coordinator |
| iv) SAR Mission Coordinator | v) On-Scene Coordinator. | |
- (25 Marks)**

Q.7 Explain the principle of "Bridge Resource Management". **(25 Marks)**

Q.8 Describe the immediate and subsequent actions of an OOW in case of a collision with another vessel. **(25 Marks)**

Q.9 a) What is the Pivot point? With simple sketches, indicate its position when the vessel is stopped, when at anchor, when going ahead or astern at a steady speed as well as when accelerating. **(10 Marks)**

b) How does transverse thrust affect a vessel going ahead & astern when she has a right handed propeller, a left handed propeller or a controlled pitch propeller? **(10 Marks)**

c) List the factors to be taken into account when allowing for Under Keel Clearance (UKC) **(05 Marks)**

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GOVERNMENT OF INDIA

Date: - 13th Jan -2020

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks each.

Q.1 a) Using meaningful sketches, explain your understanding of 'Rigidity in Space' & 'Gyroscopic Precession'? (12)

b) With the help of neat sketch describe various types of soft iron rods which could be present around the magnetic compass. (13)

Q.2 a) Explain how does a 'Janus Configuration' help to obtain the correct speed of the vessel.

b) Explain in brief the working of echo sounder.

Q.3 a) Explain how a GPS receiver determines the ship's position.

b) What are various segments of GPS?

Q.4 a) What are the information transmitted by an AIS device and at what interval? (12)

b) Define following as applicable to ECDIS:- (13)

- i) ENC ii) SENC iii) Standard Display iv) Display Base v) Vector Chart and Raster Chart

Q.5 a) As per the Bridge Procedure Guide list the duties of the Officer on Watch. (15)

b) List the contents of Part B and C of the Bridge Procedures Guide. (10)

Q.6 a) Write notes on:- (15)

- i) Search & Rescue Co-ordinators (SCs).
- ii) Search & Rescue Region (SRR), and
- iii) Track Spacing.

b) What are the advantages and disadvantages of the VTS system? (10)

Q.7 a) What is Bridge Team Management? List the Principles of BRM. (15)

b) Explain the procedures that are laid down in STCW regarding taking over a navigational watch in restricted visibility. (10)

Q.8 a) While in port receiving bunkers, fire breaks out in a hold on board your vessel. List your actions. (15)

b) Explain your immediate action on learning about a man overboard. Describe the subsequent procedure for recovery of the person from the sea. (10)

Q.9 Describe the turning circle for a loaded vessel conducting a turn to starboard and explain the effect of speed, trim, list and shallow water on its tactical diameter. (25)

GOVERNMENT OF INDIA

Date: - 7th Nov -2019

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions
2. All Questions carry equal marks each.

Q.1 a) Draw a neat sketch of compass binnacle and label various arrangements provided in it.
b) How will you plan a turn around an imaginary point? Describe the methods of execution and monitoring of the turn keeping Rate of Turn constant?

Q.2 a) Explain the operational and functional performance requirements of a Bridge Navigation Watch Alarm System.
b) What are the problems encountered in 'ranging' method of the echo sounder? How is it minimized by 'phasing' method?

Q.3 i) Explain how GPS receiver determines its position.
ii) How does DGPS improve the accuracy of a normal GPS fix?

Q.4 a) Explain the purpose of VDR and list the data recorded on VDR.
b) Describe the working of AIS.

Q.5 Briefly discuss the contents of the Bridge Procedure Guide (BPG). What does the Guide say regarding
i) Bridge familiarization and ii) 'Standing Orders' by the master?

Q.6 a) State the general principles and reporting procedures of the Ship Reporting System.
b) State the advantages and disadvantages of the following MOB patterns:-
i) Williamson Turn ii) Scharnov Turn and iii) Anderson Turn

Q.7 As an OOW for safe & efficient completion of voyage you need to keep principles of BRM in mind. Discuss the above statement with on board situation.

Q.8 a) List the immediate and subsequent actions that you will take in the event of M/E failure in a TSS.
b) As per the STCW 2010 Watch keeping Standards, how will you take over an anchor watch at night in a congested anchorage?

Q.9 a) Define 'Squat'. State the factors that affect squat.
b) What is the effect on a vessel moving close to a solid wall or bank? Explain with neat sketches.

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GOVERNMENT OF INDIA

Date: - 8th July -2019

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions
2. All Questions carry equal marks each.

Q.1 a) Explain the procedure of testing "Off Course Alarm" in Auto Pilot.
b) Explain various control units in Auto Pilot.

Q.2 a) Draw a block diagram showing the main components of an Echo Sounder and describe the functions of each.
b) Describe the basic principle of Doppler speed log. How the effect of ship's trim countered in this log?

Q.3 a) Explain how the GPS is obtaining the position.
b) Explain with sketches where applicable the various errors associated with GPS positioning.

Q.4 a) Explain the use of AIS in collision avoidance and SAR operations.
b) Explain the purpose of VDR and list the data recorded on VDR?

Q.5 a) As per bridge procedure guide, what are the duties of the officer of the watch?
b) Under what circumstances the Master should be called on bridge?

Q.6 a) Enlist the preparations carried out on board en route to render the assistance to the distressed vessel as per IAMSAR.
b) Write with diagrams the various types of search patterns in case of Man Overboard.

Q.7 a) What are all the checks required to be carried out as a OOW after taking over a navigation watch at Sea.
b) Explain what are the information / instructions available in Master's standing order and explain why it is important to OOW.

Q.8 a. What are the actions to be taken in case of fire in cargo holds containing tires when at sea.
b. Prepare a checklist for taking over a navigational watch at sea during:
i. Night time
ii. Restricted Visibility.

Q.9 What smells the ground? Explain with diagram how it affects ship maneuvering.

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GOVERNMENT OF INDIA

Date: - 8th May -2019

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions
2. All Questions carry equal marks each.

Q.1 a) With reference to Marine Gyro Compass, write short notes on – Drift, Tilt, Rigidity in Space & Precession.

b) Draw a neat sketch of magnetic compass bowl and label different parts of it.

Q.2 a) Explain the basic principle of operation of Doppler Log and show how Janus configuration achieves excellent level of performance.

b) Describe the functions of autopilot controls. Why do they need to be adjusted for optimum performance of the auto pilot?

Q.3 a) Describe the contents of navigation message and structure of the C/A Code transmitted by the GPS satellites.

b) Explain the errors of the GPS system.

Q.4 a) Why a VDR/ S-VDR system is fitted on board ships? Support your answer with the purposes it fulfills.

b) Write short notes on: - i. AIS ii. LRIT

Q.5 a) Discuss the contents of Part A of the Bridge Procedure Guide with respect to bridge organization, passage planning and duties of the officer of the watch.

b) List the information contained in the wheel house poster and pilot card.

Q.6 a) Describe various VTS systems in use. How does it help the vessel in safe Navigation?

b) State the parts, resources and limitations of the VTS system.

Q.7 What is the purpose of the log book? Your vessel is arriving in port, list the entries you will make in the log book from the time pilot on board until vessel secured alongside the berth.

Q.8 a. Prepare a check list prior to entry into a space that has been closed for an extensive period of time.

b.. List all the checks/ tests and communication with VTS /pilots prior to arrival at port.

Q.9 With neat sketches, explain the interaction likely to be experienced between two ships approaching each other head-on in a canal?

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GOVERNMENT OF INDIA

Date: - 7th Jan -2019

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions
2. All Questions carry equal marks each.

Q.1 a) Explain w.r.t. Gyro Compass the terms 'steaming error' and 'tangent error'.

b) Describe the purpose of following settings in Autopilot:

- i) Rudder ii) Counter Rudder iii) Constant helm and iv) Weather

Q.2 a) Describe the errors associated with Doppler log.

b) Draw and explain the working of an Echo Sounder.

Q.3 With respect to GPS write short notes on:

a) Space segment & Ground segment.

b) Precise Positioning Service (PPS) & Standard Position Service (SPS)

Q.4 a. Describe the Control System of an Auto-Pilot with diagram.

b. Write in short the purpose of LRIT and AIS. Draw a comparison between LRIT AND AIS.

Q.5 List and briefly discuss the contents of the Bridge Procedure Guide. What do the guidelines say regarding watch keeping arrangements? (25)

Q.6 a) What is the importance of Ship Reporting Systems for safe navigation? List the elements of the Ship Routeing System. (15)

b) In a SAR situation, what are the duties and responsibilities of the OSC? (10)

Q.7 a) Discuss the importance of 'Feedback' for effective communication on bridge. (15)

b) Write short notes on "situational awareness" as implied to maintaining navigation watch on the bridge. Discuss with one on board situations. (10)

Q.8 a) Describe the procedure for testing of controls prior departure from port. (15)

b) List the circumstances under which you will call the master. (10)

Q.9 a) With neat sketches, explain the interaction experienced between ships in an overtaking situation. (15)

b) Explain why the turning circle of the vessel increases in shallow waters. (10)

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

GOVERNMENT OF INDIA

Date: - 12th Nov -2018

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions
2. All Questions carry equal marks each.

Q.1 Explain various parts of a magnetic compass with diagram and also describe the Construction and functions of a liquid card standard magnetic compass.

Q.2 What is the principle of a Doppler Log and how does it work? Explain the various errors off an Echo-sounder?

Q.3 Explain the following:

- i) Geometric Dilution of Precision (GDOP)
- ii) Pseudo Range

Q.4 Write short notes on the following:

- a) Voyage Data Recorders
- b) Automatic Identification System
- c) Long range and identification system.

Q.5 a) Explain importance of communication in Bridge team management.

b) Explain Assertiveness with on board examples.

Q.6 a) What is Anderson's Turn and when & where can this be used?

b) Explain coordinated search and when do we use this types of search?

Q.7 Describe the duties of a OOW after your vessel an oil tanker has run aground?

Q.8 Explain the use of EPIRB, SART, Immersion Suits and EEBD.

Q.9 Draw a turning circle to port and show Advance, Transfer, Drift Angle, Tactical Diameter when:

- a) Vessel is in deep waters at full speed.
- b) Vessel is sailing in deep waters at half speed.

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

GOVERNMENT OF INDIA

Date: - 4th July -2018

**SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING**

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions
2. All Questions carry equal marks each.

Q.1 a) What is Magnetic variation, why it varies and where you will find its value?
b) Write short notes on Drifting and Tilting of a free Gyroscope?

Q.2 a) Explain the principle and the errors of EM log.
b) Describe Janus Configuration.

Q.3 With respect to GPS write short notes on:
a) Space segment & ground control segment.
b) What is a clock-bias error.

Q.4. a) Explain the difference between LRIT and AIS??
b) What is a clock-bias error?

Q.5 Describe in brief the contents of "Bridge Procedures Guide".

Q.6 a) Describe the use of VTS in Navigation.
b) Describe the essential elements of Ship Reporting System and the types of reports to be sent by the vessel.

Q.7 With the respect to bridge resource management principles explain the following:
a) Effective communication
b) Assertiveness & Leadership
c) Situational Awareness

Q.8 a) How will you draw the swinging circle on anchoring? Describe the steps to be taken when you find the vessel's position is outside the swinging circle?
b) Draw out a Checklist for anchoring.

Q.9 Write short notes on the following with regards to maneuvering:-
a) Pivot point
b) Transverse thrust
c) Drift angle
d) Bridge Resource Management (BRM)

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

SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions
2. All Questions carry equal marks each.

Q.1 a) Describe Auto Pilot as an aid to navigation.

b) Explain the purpose & function of following controls:

- i) Permanent Helm ii) Counter Rudder iii) Rudder iv) Rudder Limit v) Weather

Q.2 Explain the working of an Electro-magnetic log with a suitable diagram and compare its advantages and disadvantages with Doppler log.

Q.3 a) How will you initiate GPS on installation?

b) What factors affect the accuracy of GPS position?

c) What do you understand by 'Pseudo range' & 'True range'.

Q.4. Differentiate between the following:

a) AIS and LRIT

b) VDR and S-VDR

Q.5 Describe various duties, precautions and actions to be taken by the OOW when navigating the pilot on board.

Q.6 a) What is VTS and what are the benefits of implementing VTS?

b) Describe with suitable sketch following search patterns as per IAMSAR.

i) Expanding square search

ii) Sector-search

Q.7 a) Explain the factors to be taken into account when determining bridge manning levels.

b) Explain the reporting procedures for VTS and SRS.

Q.8 List out the Watch keepers Responsibility under the following circumstances:-

a) Storm warning while vessel at Anchor.

b) Fire on vessel at Berth.

Q.9 a) Discuss shallow water effects.

b) Draw the turning Circle Diagram of a Ship. Define the terms used in the turning Circle.

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SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 Hours

PASS MARKS: 100

MAX. MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions
 2. All Questions carry equal marks each.
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Q.1 a) Explain the term Latitude, Course and Speed error with respect to Gyro compass?
b) Explain with block diagram the working of an Autopilot?

Q.2 a) Explain Janus Configuration w.r.t. Doppler log?
b) What are the various errors connected with the working of an echo sounder and what measures do you take to eliminate the errors when using the equipment.

Q.3 a) With respect to GPS, explain space segment and ground segment.
b) How the position are obtained by GPS.

Q.4. Write short notes on: a) VDR b) AIS

Q.5 a) What is a safe speed?
b) Under what conditions, the master should be called on bridge?

Q.6 When and how the following search patterns are executed?
a) Sector search pattern
b) Expanding Square search Pattern
c) Parallel track search Pattern

Q.7 Prepare a checklist for taking over a navigational watch at sea during
a) Night time
b) Restricted Visibility

Q.8 List the duties and responsibilities of a navigation watch-keeper while vessel is navigation in:
a) Restricted waters
b) Coastal waters
c) Pilot on board

Q.9 Draw & label the turning circle diagram of a vessel with Right Handed Propulsion system. Explain, transfer, tactical diameter and drift angle.

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SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

2008 11/17
04/11/17

TIME: 3 HOURS

PASS MARKS: 100

MAX MARKS: 200

Notes:

1. Attempt any Eight out of remaining questions
2. All questions carry equal marks

Q.1 a) What are the advantages of wet compass card over dry compass card? How will you remove an Air Bubble from the compass bowl?
b) What is Dip? How compass card is kept horizontal in varying latitudes?

Q.2 With the help of a suitable diagram, explain the working of an Echo sounder?
What are the errors associated with this equipment?

Q.3 How does the GPS find its position? How the DGPS calculate even more accurate position than the GPS?

Q.4 Write short notes on following Equipments.
i) LRIT
ii) VDR

Q.5 Describe the duties of OOW in restricted visibility when:
i) At Anchor
ii) When taking over a navigational watch at sea.

Q.6 Explain the sector Pattern with the help of a Suitable Sketch. Under what circumstances it should be used?

Q.7 a) Describe the Navigational duties and responsibilities of the officer in-charge of the navigational watch at sea
b) Under what circumstances will you call Master on bridge?

Q.8 *Bridge resource management is essential in keeping a safe and efficient watch today. How would you interpret the above statement? Describe your role in the bridge team as an officer in-charge of the navigation watch

Q.9 Write short notes on the following:

- | | |
|----------------------|-------------------------------|
| a) Transverse Thrust | b) Wheel House poster |
| c) Squat | d) Bow cushion & Bank suction |

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GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

Code B1A
7-9-17
AM

TIME: 3 HOURS

PASS MARKS: 100

MAX MARKS: 200

Notes:

1. Attempt any Eight out of remaining questions
2. All questions carry equal marks

- Q.1 a) How is the Gyro Compass System Made North Seeking?
b) Explain the term latitude course & speed error with respect to the Gyro Compass
- Q.2 a) Explain use of 'Jannus' configuration in Doppler log & its use during docking operations
b) With the help of a block diagram explain how ship's speed is transmitted to remote displays
- Q.3 a) With respect to GPS explain the following:
i) System configuration and frequencies used
ii) Contents of navigation message
iii) Various DOP's used
b) Explain the difference between Raster and Vector charts
- Q.4 a) How data is transmitted by the Automatic Identification System?
b) How does the LRIT system function? Compare the AIS & LRIT.
- Q.5 Explain your understanding of the following terms:
a) 'Safe Speed' as per Rule 6 & Rule 19
b) 'Navigate with extreme caution' as per rule 19
- Q.6 What are the various search Patterns recommended in the IAMSAR? Explain with sketches
- Q.7 a) Describe in detail the purpose & importance of "lookout" in keeping a safe bridge watch
b) What is the role of maintaining situational awareness in safe navigational watch?
- Q.8 Describe in detail the immediate and follow up actions of an OOW in case of a fire in engine room while at sea
- Q.9 With the help of suitable sketch define the following:
i) Transfer ii) Advance iii) Scope iv) Transverse Thrust

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GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

Code

051216

TIME: 3 HOURS

PASS MARKS: 100

MAX MARKS: 200

Notes:

1. Attempt any Eight out of remaining questions
2. All questions carry equal marks

Q.1 With respect to a free gyroscope, with suitable figures, briefly explain the following terms:
a) Gyroscopic inertia b) Precession c) Drift and tilt

Q.2 a) Describe the main components of an Echo-sounder with the help of a simple block diagram and state the function of each component
b) Describe the working principle of a Doppler log

Q.3 a) How is the position determined by GPS? What are the errors possible in GPS?
b) Explain the functioning of DGPS

Q.4 Write short notes on:
a) AIS b) LRIT c) VDR

Q.5 a) Explain the following terminology and expression used in anchor work.
i) Anchor coming home ii) Foul Hawse iii) To grow
iv) Shortening-in-cable v) To veer cable

Q.6 a) Describe national & regional SAR system organization
b) State the duties of SAR mission co-ordinator

Q.7 a) What are the rest periods required for watch keepers as per STCW 2010?
b) When can the officer of the watch be the Sole Lookout on bridge?

Q.8 a) Explain the actions of OOW in case of dragging anchor?
b) What manoeuvres can be made to pick up a person fallen overboard?

Q.9 Describe the manoeuvring data displayed in the following:
a) Wheelhouse Poster
b) Pilot Card

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JULY - 2017

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

Code 76A

PAPER: BRIDGE WATCH KEEPING AND EMERGENCIES

TIME: 3 HOURS

PASS MARKS: 100

MAX MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks

Q.1 a) What is a free gyroscope? What are two properties of a gyroscope?

b) Explain the following with regards to Adaptive autopilot

- (i) Proportional Control (ii) Derivative Control (iii) Integral Control

Q.2 a) Describe the principle and working of a Doppler Log.

b) With respect to Echo sounder, explain the effect of density, temperature and pressure on the depth indicated.

Q.3 With respect to GPS briefly explain the following:

- a) Precise Positioning Service b) Standard Positioning Service
c) Pseudo Range d) Geometric Dilution of Precision

Q.4 a) Explain how the automatic identification systems work?

b) List the data required to be recorded by a voyage data recorder.

Q.5 Explain Rule 6 Safe Speed as per COLREGS.

Q.6 a) Describe the use of VTS in navigation.

(b) Describe the essential elements of Ship Reporting System and the types of reports to be made by the vessel.

Q.7 Explain the importance of Bridge Resource Management on board & factors that affect the effective use of BRM. Illustrate with onboard situation.

Q.8 a) Describe the procedure for testing of controls prior departure from port.

b) State the circumstances under which you will call the master.

Q.9 a) What factors would you consider in deciding the anchor position and amount of cable to use.

b) Write short notes on (i) Pivot point (ii) Transverse thrust (iii) Drift angle.

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GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
FUNCTION: NAVIGATION
PAPER: BRIDGE WATCH-KEEPING AND EMERGENCIES
PASS MARKS: 100

Code 78A

TIME: 3 HOURS

MAX MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks

Q.1 a) Explain the starting procedure of gyro compass
b) Why the vessel is required to be swung once a year to verify Magnetic Compass Deviation Card?

Q.2 a) Explain with the aid of a block diagram the working of an Echo Sounder.
b) Describe the errors of Echo Sounder.

Q.3 a) What message is contained in each sub-frame of the GPS navigational message?
b) What are the limitations of an AIS system?

Q.4 Explain the following:
a) Purpose of LRIT
b) Data transmitted by LRIT
c) Authorized receivers / users of LRIT
d) Functions of LRIT National Data Centre

Q.5 Explain with block diagram the working of an Auto pilot.

Q.6 What are the various search patterns recommended in the IAMSAR? Explain with sketches.

Q.7 Prepare a checklist for Handing over a Navigational Watch at Sea in Restricted Visibility. Also enlist the other pressing activities which need to be undertaken onboard other than the items listed in your bridge checklist.

Q.8 a) What are the duties of OOW while keeping an anchor watch in a congested anchorage?
b) List the actions to be taken while carrying out rescue of survivors from another vessel

Q.9 a) Describe the procedures for
(i) Clearing the anchors (ii) Anchoring (iii) Securing the anchors for sea
b) Describe the dangers of using different rope types in one mooring system.

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

Code 77A

PAPER: BRIDGE WATCH KEEPING AND EMERGENCIES

TIME: 3 HOURS

PASS MARKS: 100

MAX MARKS: 200

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks

- ✓ Q.1 With regards to Gyro compass, briefly explain
✓ (i) Precession of the axis (ii) Drift and tilt (iii) Procedure to determine the compass error
- Q.2 a) Describe the principle and working of a Doppler Log. List the main error sources of Doppler log.
✓ b) Differentiate between ground reference speed and water reference speed.
- Q.3 a) With respect to GPS Explain the following:
✓ i) Space segment and Ground segment
✓ ii) What factors affect the accuracy of a GPS position
b) Explain the difference between Raster and Vector Charts
- ✓ Q.4 a) What is the principle of Automatic Identification System? What are the advantages of AIS?
b) Write a short note on VDR.
- Q.5 What are the contents of the Bridge Procedures Guide. Briefly describe each section of the guide.
- ✓ Q.6 a) What is the purpose of IAMSAR ? Explain the duties & responsibilities of the On-scene
① ~~Co-ordinator.~~
b) State the objectives and limitations of the VTS system.
- ② ~~Q.7 a) How will you know your vessel is dragging anchor?
b) Your vessel is at anchor, how will you take over your watch.~~
- ③ ~~Q.8 a) Your vessel ran aground, enumerate the action to be taken.
b) Describe the immediate actions to be taken in case of steering failure.~~
- Q.9 With simple diagram, describe briefly:
a) With respect to stopping distance, explain head reach and track reach.
b) Williamson Turn.

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JAN 2017





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

Code 80A

PAPER: BRIDGEWATCH-KEEPING AND EMERGENCIES
CLASS MARKS: 100

MAX MARKS: 200

TIME: 3 HOURS

Notes:

1. Attempt any Eight out of Nine Questions.
2. All Questions carry equal marks

10/11/2016

Q.1 a) What are the advantages of wet compass card over dry compass card? How will you remove an Air Bubble from the compass bowl?
b) What is Dip? How compass card is kept horizontal in varying latitudes?

Q.2 Explain working of Doppler log, why do we require Janus configuration.

Q.3 a) Describe how a GPS receiver determines the speed of the ship.
b) Explain the various errors associated with GPS obtained position.

Q.4 Write short notes on:

- a) AIS b) LRIT c) VDR

Q.5 List the contents of the Bridge Procedures Guide. What instructions for masters and navigating officers are contained in Part A of the guide.

Q.6 a) Describe National & Regional SAR system Organisation.
b) State the duties of SAR mission co-ordinator.

Q.7 a) Explain the factors to be taken into account when determining bridge manning levels.
b) Explain the reporting procedures of VTS and SRS.

Q.8 Describe actions to be taken as OOW in case of FIRE in the cargo hold of your vessel when vessel is:
(a) In Port and (b) At sea

Q.9 Your vessel is transiting a river a river: describe with illustration the various effects your vessel is subjected to when:

- a) Passing another vessel close by. b) When the UKC is less.
b) Passing close to river bank. d) Overtaking another vessel.

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**GOVERNMENT OF INDIA
SECOND MATE OF A FOREIGN GOING SHIP
OFFICER INCHARGE OF A NAVIGATIONAL WATCH**

FUNCTION: NAVIGATION

PAPER: BRIDGE WATCH KEEPING & EMERGENCIES

TIME: 3 HOURS

PASS MARKS: 100

MAX MARKS 200

Notes:

1. Attempt any Eight out of Nine Questions
2. All Questions carry equal marks i.e. 25 marks each.

- Q.1** a) How is the Gyro Compass system made North Seeking?
b) Explain the term Latitude, Course and speed error with respect to Gyro compass?
- Q.2** a) Explain how does a "Janus configuration" help to obtain the correct speed of the vessel.
b) Explain in brief the working of echo sounder.
- Q.3** a) Explain the working principle of DGPS and its limitations.
b) With respect to GPS, explain the following:
(i) Navigation message (ii) P & C/A code
- Q.4** a) State the principle and working of AIS.
b) What is the purpose of LRIT?
- Q.5** a) How will you effectively use the various resources such as Navigational equipment on the bridge and available man power for safe keeping a safe navigational watch at sea based on the principle of Bridge Resource Management?
b) What you mean by situational awareness..
- Q.6** Describe various types of search patterns used by the vessel for rescue purpose. Explain how the ship reporting system provides the necessary information for search and rescue in case of distress?
- Q.7** (a) State the STCW guidelines in ensuring a safe and efficient bridge watch.
(b) List out the various publications and manuals you would require for safe navigation.
- Q.8** Describe your actions as the "Officer in charge of Watch" in the following situations:
a) Vessel dragging anchor towards another vessel 2 miles away.
b) Collision with another vessel
c) Fire in Engine room
- Q.9a** Draw the turning circle diagram of a ship and define the following terms
(i) Advance (ii) Transfer (iii) Drift angle (iv) Tactical diameter
b) What do you understand by the term "Pivot Point"? How does the Pivot point effect maneuvering of the vessel when going ahead?

13.07.2018
13/7-18-A



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

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 HOURS

PASS MARKS: 100

MAX. MARKS: 200

NOTES:

1. Attempt any Eight out of Nine questions.
2. All questions carry equal marks.

- Q. 1 a) Explain the course and speed correction of the Gyro and how will you apply?
b) Why the vessel is required to be swung once in a year to verify Magnetic Compass Deviation card?
- Q. 2 a) What is the principle of Doppler Speed Log?
b) How does a 'Jannus configuration' of transducers help to obtain the correct speed of the vessel?
- Q. 3 a) Write in brief about the various segments of GPS & DGPS.
b) What is clock-bias error?
- Q. 4 a) Briefly explain the working principle of AIS?
b) How will you find the Index error of a sextant?
- Q. 5 In brief, describe the contents of "Bridge Procedures Guide". List out the circumstances when the Master has to be called on bridge at sea passage?
- Q. 6 a) Write the contents of IAMSAR Volume III.
b) When & how the Sector Search is executed?
- Q. 7 What are the duties of O.O.W. when a vessel is at anchor? How will you know your vessel is dragging anchor?
- Q. 8 A distress message has been received from a sinking vessel 50 miles away. State your actions on receiving this call. How would you go about preparing to pick up and receive survivors?
- Q. 9 a) Explain the principles of Bridge Resource Management?
b) Explain the Pivot point of vessel and effect of wind on ship handling?

$V = \frac{d}{t}$



GOVERNMENT OF INDIA

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

FUNCTION: NAVIGATION

PAPER: BRIDGE EQUIPMENT & WATCHKEEPING

TIME: 3 HOURS

PASS MARKS: 100

MAX. MARKS: 200

NOTES:

1. Attempt any Eight out of Nine questions.
2. All questions carry equal marks.

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- Q. 1** a) How is the Gyro Compass System made North Seeking?
b) Explain the term latitude course & speed error with respect to the Gyro Compass.
- Q. 2** a) Explain the use of 'Jannus' configuration in Doppler log and its uses during docking operations.
b) With the help of a block diagram explain how ship's speed is transmitted to remote displays.
- Q. 3** a) With respect to GPS explain the following:
i) System configuration and frequencies used
ii) Contents of navigation message
iii) Various DOP's used
b) Explain the difference between Raster and Vector charts.
- Q. 4** a) Explain the limitations of AIS and the precautions during the use of same for collision avoidance?
b) What is the purpose of LRIT? How does it differ from AIS?
- Q. 5** a) Write short notes on the contents of the Bridge Procedures Guide?
b) How would you take over a bridge watch, during night and while navigating in piracy prone areas?
- Q. 6** a) How do VTS contribute to safety of life at sea?
b) What are the elements of ship reporting system? What kind of reports does a ship need to send out?
- Q. 7** a) What are the rest periods required for watch keepers as per STCW 2010?
b) When can the officer of the watch be the Sole Lookout on bridge?
- Q. 8** a) Explain the actions of OOW in case of dragging anchor?
b) What manoeuvres can be made to pick up a person fallen overboard?
- Q. 9** Describe the manoeuvring data displayed in the Wheelhouse Poster & the Pilot Card.

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Jan 20/6