

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**Mar/Apr'26 SE**  
**Programme Name: B.Sc Nautical Science**  
**Semester: III**

**Subject Code: UG21T6302**  
**Subject Name: BRIDGE ELECTRONIC EQUIPMENT & WATCHKEEPING PAPER**

Date: 05.03.2026

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

**General Instructions**

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in the respective section.
- (iii) Radar Plotting chart to be used.

**Section A**

**Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable. (10 Marks)**

1. Gyro compass operation is fundamentally based on the principle of
  - a) Gyroscopic gravity
  - b) Gyroscopic velocity
  - c) Gyroscopic inertia
  - d) Earth magnetic field
  
2. A Search and Rescue Transponder (SART) will indicate a distress situation by creating a series of \_\_\_\_\_ blips on X-band radar display.
  - a) 6
  - b) 8
  - c) 12
  - d) 14

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3. Which frequency band does AIS primarily operate on?

- a) HF
- b) MF
- c) VHF
- d) UHF

4. The most common geodetic datum used by GPS, ECDIS, and Electronic Navigational Charts (ENCs) is \_\_\_\_\_.

- a) WGS 84
- b) NAD 83
- c) ED 50
- d) GDA 94

5. The primary purpose of the Voyage Data Recorder (VDR) is

- a) accident investigation.
- b) Cargo Calculation
- c) Navigation
- d) Monitoring Wind Speed and direction

6. As per the STCW Code, watchkeepers are required to take a minimum of

- a) 10 hours rest in any 24-hour period.
- b) 12 hours rest in any 24-hour period.
- c) 8 hours rest in any 24-hour period.
- d) 6 hours rest in any 24-hour period.

7. Electronic Navigational Charts (ENCs) are generally classified as \_\_\_\_\_ charts.

- a) Raster
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b) Paper

c) Vector

d) Hybrid

8. Long Range Identification and Tracking (LRIT) systems typically transmit ship position and identity data at a minimum frequency of

a) Every 15 minutes

b) Every hour

c) Every 6 hours

d) Continuously (real-time)

9. The Bridge Navigational Watch Alarm System (BNWAS) must be operational whenever the ship is underway and should also be used when the ship is \_\_\_\_\_.

a) at anchor.

b) In Port

c) In Dry dock

d) All of above

10. The primary purpose of the Trial Manoeuvre function on an ARPA system is to:

a) Test the ARPA equipment self-diagnostics

b) Simulate a proposed change in own ship's course and/or speed

c) Automatically acquire the nearest 40 targets

d) Calculate the true wind vector

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## Section B

### Five Questions of 02 Marks each (10 Marks)

- TMI
11. Explain the characteristics of Horizontal Beam Width (HBW) and Vertical Beam Width (VBW) in relation to radar performance.
  12. Differentiate between Raster Navigational Charts (RNCs) and Electronic Navigational Charts (ENCs).
  13. State the main purpose and accuracy benefit of Differential GNSS (DGNSS).
  14. Explain the difference in purpose and operational range between AIS and LRIT.
  15. State four circumstances when the Officer of the Watch (OOW) must call the Master immediately.
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## Section C

### Seven Questions of 10 Marks each. Attempt any 05 questions. (50 Marks)

16. While on a course of 340 (T) at 15 knots, a target on the radar screen was observed at 0800 to bear 020 (T) at a range of 12 M. At 0812, it bore 017 (T) at 9 M range. Find the
1. CPA and TCPA (2+2 Marks)
  2. Course and speed of target (2+2 Marks)
  3. And the aspect at 0812. (2 Marks)
- (This question requires the use of a Radar Plotting Charting).  
Answers must also be written on the Answer sheet.*
17. A) Write a short note explaining the use of the Parallel Indexing (PI) technique in radar navigation **with diagram**, and state its primary purpose. (5 Marks)
- TMI B) Explain why damping is essential in a gyrocompass, specifically addressing the requirement for damping in Azimuth and Tilt. (5 Marks)
18. A) Describe the concept of Category Zone of Confidence (CATZOC) used in Electronic Navigational Charts (ENCs) and explain its relevance during passage planning. (5 Marks)
- B) Discuss types of errors associated with Global Navigation Satellite System (GNSS) position fixing, **excluding** Dilution of Precision (DOP) and Receiver Autonomous Integrity Monitoring (RAIM). (5 Marks)
19. (A) Describe the three major segments of the Global Positioning System (GPS). Draw a diagram. (5 Marks)
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B) Explain the working principle of Differential GNSS (DGNS), outlining how it achieves greater accuracy than standard GNSS. (5 Marks) .

20.A) List types of data required to be recorded by a Voyage Data Recorder (VDR) or Simplified VDR (S-VDR). (5 Marks).

B) Discuss the function of the Bridge Navigational Watch Alarm System (BNWAS) and describe the sequence of alarms it uses if the Officer of the Watch (OOW) is incapacitated. (5 Marks)

21.A) Identify three limitations and three necessary precautions when using AIS for collision avoidance. (5 Marks)

B) State the primary principle defining the pilot's role when embarked, and who retains ultimate responsibility for the ship's safety.(5 Marks).

22.A) List five safety alarms provided by an ECDIS during route monitoring. (5 Marks).

B) Outline the essential checks and information exchange required during an effective watch handover. (5 Marks)

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