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**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – December 2025**  
**Programme Name: MBA (PSM/ITL)**  
**Semester: 3**  
**Subject Code: PG21/22E3301**  
**Subject Name: - TECHNOLOGY IN PORT OPERATIONS**

Date: 15.12.2025

Max Marks: 60

Duration: 03 Hrs

Pass Marks: 30

General Instructions

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

Section A

1. The technology that is primarily used for real-time equipment monitoring without shutdown in ports

- A) Manual inspection
- B) On-line condition monitoring
- C) Periodic maintenance
- D) Visual inspection

2. An internet of value that promotes efficiency through cooperation and trust is

- A) GPS
- B) RFID
- C) Block chain
- D) 5G

3. The technologies that jointly can enable smart ports to achieve self-learning and self-decision-making capabilities

- A) Digital Twin and Machine Learning
- B) Manual fault inspection and recording
- C) Electromechanical synchronization and 5G
- D) Routine inspection system and excel applications

4. A digital middle office in smart port can

- A) support unified digital strategy across terminals

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- B) Avoid duplication of systems and reduce cost
  - C) can integrate scattered resources
  - D) All of the above

5. The effectiveness of digital twin

- A) is enhanced with higher number of sensors in the terminal
- B) is enhanced with lesser number of sensors in the terminal
- C) is not influenced by number of sensors
- D) None of the above

6. In an organization's structure, which of the following best describes the role of the middle office?

- A) It directly interacts with customers and handles sales.
- B) It performs back-end administrative and accounting tasks.
- C) It supports the front office by providing management, risk control, and IT services.
- D) It is responsible only for marketing and client relations.

7. What is the main function of a data middle office in an enterprise?

- A) To manage customer relations and marketing promotions
- B) To provide storage, cleaning, and analysis of massive data for business innovation
- C) To handle transaction settlements and HR functions
- D) To design and manufacture IT hardware

8. What is the main goal of implementing intelligent ship control in container terminals?

- a) To reduce the number of ships handled per day
- b) To improve overall operation efficiency by intelligently controlling the instruction sequence of loading and unloading
- c) To replace human operators entirely
- d) To focus only on container storage optimization

9. The technology that is primarily used in container number capture at terminal gates/nodes is

- a) Optical Character Recognition
- b) Ultra-Violet Scanning
- c) Infrared imaging
- d) LiDAR scanning

10. The Vessel Traffic Management System in a port

- a) Enhances safety of navigation
- b) Optimizes traffic-flow in the channel
- c) Safeguards marine and shore installations
- d) All of the above

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## Section B

Answer all questions, each question carries 2 marks

11. Explain the use of digital twin in port terminals
12. Explain the use of machine vision in port gate operation
13. Explain why port organisations need to adopt a middle-office strategy
14. Explain the concept of Cyber-physical system (CPS)
15. Explain the positive aspects of Block chain as a solution in maritime ecosystem.

## Section C

Answer any 5 questions. Each question carries 8 marks

16. Explain 'interactive simulation' and its applications in port operations
17. Explain the difference between virtual reality and augmented reality and advantages of using VR based visualization supervision in port operations
18. Explain AI based applications in container location optimization
19. Explain the main function of machine vision technology and two key advantages of machine vision compared to human visual inspection
20. Write short notes on [a] comprehensive perception [b] intelligent decision making and [3] Autonomous handling
21. Explain the role of government in enabling innovation for the smart port eco system
22. Explain the features of a smart port in contrast to a conventional port