

C-7475

Sub. Code

11616

B.Sc. DEGREE EXAMINATION, APRIL 2026

First Semester

Nautical Science

NAUTICAL PHYSICS & ELECTRONICS – I

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. _____ materials display higher magnetic susceptibility.
(a) Ferromagnetic (b) Paramagnetic
(c) Diamagnetic (d) Electromagnetic
2. Latent heat is taken at _____.
(a) Constant temperature
(b) Constant pressure
(c) Either (a) or (b)
(d) Both (a) and (b)
3. The geometrical shadow of an opaque object is observed when light is incident on it, this is due to _____.
(a) diffraction of light
(b) dispersion of light by an object
(c) light travelling in straight line
(d) refraction of light

4. Speed of sound is maximum in _____.
- (a) Vacuum (b) Gases
(c) Liquids (d) Solids
5. When the flow parameters at any given instant remain same at every point then flow is _____.
- (a) quasi static (b) steady state
(c) laminar (d) uniform
6. The elastic moduli of solids are _____.
- (a) Young's Modulus (b) Bulk modulus
(c) Rigidity Modulus (d) All the above
7. In tunnel diodes carrier velocities are _____.
- (a) Very low (b) Very high
(c) Moderate (d) Nil
8. Which of the following logic gates are known as universal gates?
- (a) XOR, NAND (b) OR, NOT
(c) NOR, XNOR (d) NOR, NAND
9. A super heterodyne receiver with an IF of 450 KHz is tuned to a signal at 1200 KHz. Then the image frequency is _____.
- (a) 750 KHz (b) 900 KHz
(c) 1650 KHz (d) 2100 KHz
10. 8086 microprocessor is _____ first X86 processor.
- (a) Intel's
(b) Motorola's
(c) Nano Xplore
(d) STMICROELECTRONICS

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Define Magnetic intensity and permeability.

Or

- (b) Explain the laws of refraction.

12. (a) State (i) Law of Floation (ii) Archimedes principle.

Or

- (b) Explain Photo Electric Cell.

13. (a) Explain phase shift oscillator.

Or

- (b) Derive De-Morgan's theorem.

14. (a) Explain the working of Amplitude modulation.

Or

- (b) Explain Diode detector circuit.

15. (a) Explain AM receivers.

Or

- (b) Explain the applications of microprocessors.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Discuss the reflection taking place in plane and spherical mirror.

Or

- (b) Explain Doppler effect.

17. (a) Explain Bernoulli's theorem and its applications.

Or

- (b) Explain the construction and symbol of Zener Diode.

18. (a) What is Bipolar-junction transistor & explain its characteristics?

Or

- (b) Explain transistor Wein bridge oscillator.

19. (a) What is the working and derivation of frequency modulation and modulation index?

Or

- (b) Derive side bands in F.M.

20. (a) Explain the working of Radio detection finding.

Or

- (b) Draw and explain the architecture of 8085 microprocessor.

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Sub. Code

11623

B.Sc. DEGREE EXAMINATION, APRIL 2026

Second Semester

Nautical Science

SHIP CONSTRUCTION

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. The outward curvature of the side shell above the water line at the forward end of the ship is _____.
(a) bow (b) flare
(c) shear (d) camber
2. The distance from the waterline to the highest peak point of the vessel is _____.
(a) air draft (b) water draft
(c) ventilator (d) sheer
3. Load line is located at ship's _____.
(a) bridge (b) bow
(c) propeller (d) hull

4. What are the grades used in ship building industry?
(a) A to E (b) A to C
(c) A to D (d) A to F
5. _____ is fitted in all decks to give effective drainage.
(a) Scupper (b) Downspout
(c) Drain (d) Scuttle
6. _____ is the pipe passing through the bow section of a ship that the anchor chain passes through.
(a) Spurling pipe (b) Chain locker
(c) Hawse pipe (d) Bitter end
7. Sturm box is also called as _____.
(a) Steel box (b) Rope box
(c) Cartons (d) Conex box
8. _____ is a piping system intended for disposing water.
(a) Spurling pipe (b) Hawse pipe
(c) Bilge pipe (d) Both (a) and (b)
9. A forward compartment in the lower part of a ship for showing the chain cable is called _____.
(a) Spurling pipe (b) Chain locker
(c) Hawse pipe (d) Bitter end
10. _____ protects the hull steel from degradation due to repeating striking.
(a) Striker plate (b) Keel plate
(c) Door striker (d) Shell plate

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Sketch & describe frames in a ship.

Or

(b) Explain the importance of beams & beam knees.

12. (a) Sketch Bilge knees.

Or

(b) Explain weather-tightness of Hatches.

13. (a) Describe chain lockers.

Or

(b) Explain cable stopper.

14. (a) Explain the construction of Air pipes.

Or

(b) Explain Hold drainage systems.

15. (a) Explain about the types of rudder.

Or

(b) Explain controllable pitch propeller.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Sketch & describe beams and beam knees.

Or

- (b) Explain the functions, construction & stiffening of water tight bulkheads.

17. (a) Sketch & describe fore peak & after peak tanks.

Or

- (b) Explain oil, chemical & gas tankers.

18. (a) Sketch & describe the construction of Hawse pipes & their security arrangements.

Or

- (b) Describe Roller, multi angle, pedestal & panama fair lead.

19. (a) Sketch & describe the construction of sounding pipes.

Or

- (b) Explain Genera I pumping arrangements.

20. (a) Sketch & explain Balances & Semi-balanced Rudders.

Or

- (b) Explain the methods used for Gas welding.

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Sub. Code

11624

B.Sc. DEGREE EXAMINATION, APRIL 2026.

Second Semester

Nautical Science

SHIP OPERATION TECHNOLOGY

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. Forecastle deck is used for
 - (a) Prevent the entry of sea water
 - (b) Drainage of tank water
 - (c) Drainage of fresh water
 - (d) None of the above

2. Chemical suits are used in
 - (a) General cargo ship.
 - (b) Ro-Ro ship
 - (c) Timber carrier
 - (d) Patrol vessel

3. Whipping is used to prevent the rope from
 - (a) Fraying
 - (b) Tightening
 - (c) Loosening
 - (d) None of the above

4. The Jack staff is used For hoisting
 - (a) National flag
 - (b) Courtesy flag
 - (c) House flag
 - (d) None of the above

5. Which flag is hoisted while Pilot on board
 - (a) Flag “G”
 - (b) Flag “H”
 - (c) Flag “B”
 - (d) Flag “I”

6. The flag hoisted while Bunkering is
 - (a) Flag Bravo
 - (b) Flag Alpha
 - (c) Flag Delta
 - (d) Flag Zulu

7. The Courtesy flag is hoisted while the ship is at
 - (a) Foreign port
 - (b) Inland water
 - (c) Leaving Maor port
 - (d) None of the above

8. High pressure water jet is used for cleaning
 - (a) Hord space
 - (b) Double bottom tank
 - (c) Peaktank
 - (d) Cofferdam

9. The colour of Anchor light is
 - (a) White
 - (b) Red
 - (c) Blue
 - (d) Green

10. The periodicity of safety meeting on board ship is
 - (a) Every week
 - (b) 4-6 weeks
 - (c) 2 weeks
 - (d) Every 10 months

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Enlist any five synthetic fibre ropes used on board ship.

Or

- (b) Mention the principal dimension of ship.

12. (a) State the meaning of 6/1, 6/4 and 6/37 type of wire ropes.

Or

- (b) How will you measure the size of ropes.

13. (a) Explain the different flags to be hoisted while leaving ports at night time.

Or

- (b) List the precautions for entering confined spaces.

14. (a) Describe the procedures for operating Hatch covers.

Or

- (b) Explain the procedure to carry out risk assessment.

15. (a) Describe Cold work permit.

Or

- (b) Discuss the precautions to be followed while painting tunnel

Part C

(5 × 8 = 40)

Answer all questions, choosing either (a) or (b).

16. (a) Draw the diagram of ship and list any ten parts of ship.

Or

- (b) Explain any five personal protective equipment.

17. (a) Describe different type steel roes used on board ship.

Or

- (b) Explain the standard crane signals used which loading and unloading on board ship.

18. (a) Explain how to dress the ship.

Or

- (b) Explain the procedures of manual lifting and carrying of weights.

19. (a) Discuss the safety precautions to be observed while using electric, pneumatic and hydraulic power tools.

Or

- (b) Explain care and maintenance of wire ropes.

20. (a) Explain the conduct of safety committee meetings on board ship.

Or

- (b) State the role or safety committee and safety officer in maintaining safety standards on board.
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11625

B.Sc. DEGREE EXAMINATION, APRIL 2026

Second Semester

Nautical Science

NAUTICAL MATHEMATICS – II

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. The period of the function $f(x) = \cos 2x$ is _____.

(a) π

(b) 2π

(c) $\frac{\pi}{2}$

(d) $\frac{2\pi}{3}$

2. A function $f(x)$ is called odd if _____.

(a) $f(-x) = f(x)$

(b) $f(x) = x^2$

(c) $f(-x) = -f(x)$

(d) $f(x) = 1$

3. $L(t^n) =$ _____.

(a) $\frac{1}{s}$

(b) $\frac{1}{s^2}$

(c) $\frac{1}{s-a}$

(d) $\frac{n!}{s^{n+1}}$

4. $L^{-1}\left[\frac{a}{s^2 + a^2}\right] = \underline{\hspace{2cm}}$.
- (a) $\sin(at)$ (b) $\cos(at)$
(c) $\sinh(at)$ (d) $\cosh(at)$
5. The mode of the data 1, 2, 2, 3, 3, 3, 3 is $\underline{\hspace{2cm}}$.
- (a) 1 (b) 3
(c) 2 (d) 0
6. Which of the following is true for correlation coefficient r
- (a) $0 \leq r \leq 1$ (b) $-1 \leq r \leq 1$
(c) $-2 \leq r \leq 1$ (d) $-3 \leq r \leq 0$
7. $\Delta = \underline{\hspace{2cm}}$.
- (a) $E - 1$ (b) $E + 1$
(c) $\frac{E + 1}{2}$ (d) $1 - E$
8. Which of the following is true?
- (a) $E^0 = 1$ (b) $E \cdot \Delta = \Delta \cdot E$
(c) Both (a) and (b) (d) $E \cdot \Delta > \Delta \cdot E$
9. The error of Simpson's 1/3 rule is $\underline{\hspace{2cm}}$.
- (a) h (b) h^2
(c) h^3 (d) h^4
10. The error of Trapezoidal rule is $\underline{\hspace{2cm}}$.
- (a) h (b) h^2
(c) h^3 (d) h^4

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Define Inner product.

Or

- (b) Express $f(x)=x$ as a half range sine series in $0 < x < 2$.

12. (a) Find the Laplace transform of $\sqrt{t}e^{-3t}$.

Or

- (b) Find the Inverse Laplace transform of $\frac{s^2 - 3s + 4}{s^3}$.

13. (a) Calculate the mean and standard deviation for the following :

Size of item :	6	7	8	9	10	11	12
Frequency :	3	6	9	13	8	5	4

Or

- (b) Ten participants in a contest are ranked by two judges as follows :

$x :$	1	6	5	10	3	2	4	9	7	8
$y :$	6	4	9	8	1	2	3	10	5	7

Calculate the rank correlation coefficient ρ .

14. (a) Find the real root of $3x = \cos x + 1$ by Newton's method.

Or

- (b) Form a table of differences for the function $f(x) = x^3 + 5x - 7$ for $x = -1, 0, 1, 2, 3, 4, 5$.

15. (a) Given the values

$x :$	5	7	11	13	17
$f(x) :$	150	392	1492	2366	5202

evaluate $f(9)$ using Lagrange's formula.

Or

- (b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Obtain Fourier series for the function $f(x)$ given by

$$f(x) = \begin{cases} 1 + \frac{2x}{\pi}, & -\pi \leq x \leq 0 \\ 1 - \frac{2x}{\pi}, & 0 \leq x \leq \pi \end{cases}$$

Or

- (b) Expand $f(x) = x \sin x$ as a Fourier series in the interval $0 < x < 2\pi$.

17. (a) Find the inverse Laplace transforms of $\frac{s}{s^4 + 4a^4}$.

Or

- (b) Apply convolution theorem and evaluate $L^{-1}\left[\frac{s}{(s^2 + a^2)^2}\right]$.

18. (a) In a partially destroyed laboratory record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate \bar{x} , \bar{y} and the coefficient of correlation between x and y .

Or

- (b) Calculate the mean, median and mode for the following :

Weight in gms:	0-10	10-20	20-30	30-40	40-50	50-60
No. of articles :	14	17	22	26	23	18

19. (a) By using bisection method, find an approximate root of the equation $\sin x = \frac{1}{x}$ lies between 1 and 1.5, (measured in radians). Carry out computations upto 7th stage.

Or

- (b) Prove the following :

(i) $\mu = \frac{1}{2}(E^{1/2} + E^{-1/2})$

(ii) $\Delta = E\nabla = \nabla E = \delta E^{1/2}$.

20. (a) From the following table, estimate the number of students who obtained marks between 40 and 45 :

Marks :	30-40	40-50	50-60	60-70	70-80
No. of students :	31	42	51	35	31

Or

- (b) Compute the value of $\int_{0.2}^{1.4} (\sin x - \log x + e^x) dx$ using Simpson's $\frac{3}{8}$ th rule.
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11626

B.Sc. DEGREE EXAMINATION, APRIL 2026

Second Semester

Nautical Science

NAUTICAL PHYSICS & ELECTRICITY - I

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. The unit of magnetic flux is _____.
(a) Tesla (b) Ampere
(c) Weber (d) Henry

2. The phenomenon where a current is induced in a nearby coil is called _____.
(a) Self-induction (b) Lenz effect
(c) Mutual induction (d) Magnetic resonance

3. In an AC circuit, the current
(a) Remains constant in one direction
(b) Flows only in one direction
(c) Increases continuously
(d) Changes direction periodically

4. Power factor is defined as the ratio of _____.
- (a) real power to apparent power
 - (b) apparent power to real power
 - (c) real and reactive power
 - (d) reactive power to apparent power
5. The wheatstone bridge is primarily used to measure _____.
- (a) Capacitance (b) Inductance
 - (c) Resistance (d) Frequency
6. A coil has a high Q-factor if it has
- (a) Low resistance (b) High inductance
 - (c) High resistance (d) Both (a) and (b)
7. In Kirchoff's current Law the sum of currents entering a node is equal to the _____.
- (a) Zero
 - (b) Sum of voltages
 - (c) Sum of currents leaving the node
 - (d) Product of resistance and voltage
8. Kirchoff's voltage law is based on the principle of _____.
- (a) conservation of energy
 - (b) conservation of charge
 - (c) conservation of current
 - (d) conservation of mass
9. The output voltage of an AC generator is _____.
- (a) Constant (b) Unidirectional
 - (c) Alternating (d) Zero

10. The working principle of a venture tube is based on _____.
- (a) Pascal's law
 - (b) Newton's second law
 - (c) Archimedes principle
 - (d) Bernoulli's theorem

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe Faraday-Lenz's law.
Or
(b) Explain self and mutual inductance.
12. (a) Describe AC voltage.
Or
(b) Explain earthling insulators.
13. (a) Explain the applications of Wheatstone bridge.
Or
(b) Explain Q of a coil.
14. (a) What is constant voltage?
Or
(b) Explain current source.
15. (a) Describe calibration.
Or
(b) Explain about Thermister.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Describe the relation between magnetism and electricity.

Or

- (b) Explain the production of Electro-magnetic induction and current.

17. (a) Explain resistances and capacitors in series.

Or

- (b) Explain parallel RLC circuits.

18. (a) Describe Bridge circuits.

Or

- (b) Explain Wheatstone bridge.

19. (a) State and prove Kirchoff's voltage law.

Or

- (b) Explain the classification of network elements.

20. (a) Describe the principle and working of AC generator.

Or

- (b) Describe the heating effect of current and heaters.
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Sub. Code

11628

B.Sc. DEGREE EXAMINATION, APRIL 2026

Second Semester

Nautical Science

FUNDAMENTALS OF COMPUTER SCIENCE

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

- Which number system uses only 0 and 1?
(a) Decimal (b) Octal
(c) Binary (d) Hexadecimal
- 1's complement of binary number 1010 is _____.
(a) 1010 (b) 0101
(c) 1111 (d) 1001
- Which of the following is a type of primary memory?
(a) ROM (b) RAM
(c) CD-ROM (d) USB Drive
- Which memory retains data even after the computer is turned off?
(a) RAM (b) Cache
(c) ROM (d) Registers

5. What is Dig Cash primarily used for?
- (a) Secure digital transactions
 - (b) Advertising
 - (c) Designing
 - (d) None
6. What is the main function of cyber cash?
- (a) Web browsing
 - (b) Secure electronic payments
 - (c) File storage
 - (d) None
7. _____ in MS Word allows you to add information at the top of every page.
- (a) Footer
 - (b) Header
 - (c) Title
 - (d) Caption
8. _____ is used to create a workbook in MS Excel.
- (a) MS Word
 - (b) MS Paint
 - (c) MS Excel
 - (d) None
9. _____ is a valid Python Operator.
- (a) &&
 - (b) ||
 - (c) and
 - (d) ==
10. What will print (2**3) output in Python?
- (a) 6
 - (b) 8
 - (c) 9
 - (d) 5

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain with examples the process of converting number between binary, octal, decimal and hexadecimal number system.

Or

- (b) Differentiate between ASCII and EBCDIC codes. Provide example of how characters are represented.

12. (a) Differentiate between main memory and secondary memory with examples.

Or

- (b) Explain the roles of Compiler, Assembler and Interpreter.

13. (a) Write short notes on cyber cash and Dig cash.

Or

- (b) What are the concepts of Electronic Communication used in E-Commerce?

14. (a) Write short notes on Headers and Footers in MS Word.

Or

- (b) List and explain different slide transitions in powerpoint.

15. (a) Explain any five Python operators with syntax and examples.

Or

- (b) What are Python datatypes? Explain any five with examples.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain the binary number system in detail with examples.

Or

- (b) Compare and contrast the various binary codes used with their applications and advantages.

17. (a) Explain in detail the different types of computer memory provide examples for each.

Or

- (b) Discuss the various programming techniques and software used in computers.

18. (a) Explain the role in EDI in E-Commerce and its impact on modern business transaction.

Or

- (b) What are key concerns for E-Commerce growth? Discuss with suitable examples.

19. (a) Explain the steps involved in inserting tables and formatting text in MS Word with examples.

Or

- (b) Explain in detail how to create a presentation in MS Powerpoint with formatting, transition, pictures and chart insertion.

20. (a) Explain in detail the different types of loop control statements in Python with examples.

Or

- (b) Explain Python operations and datatypes in detail with examples.

6. _____ in the upper atmosphere is vital to all life as it protects the earth from the sun's harmful infrared radiation.
- (a) Ozone (b) Troposphere
(c) Mesosphere (d) Exosphere
7. How many cloud types are there?
- (a) 7 (b) 10
(c) 8 (d) 6
8. Release of CO₂ is the main source of pollution. (True or False)
9. _____ is the layer separating Troposphere and stratosphere.
- (a) Ozone (b) Tropopause
(c) Exopause (d) Mesopause
10. A wind rose is a graphic tool used by Meteorologist to summarize information on wind speed and direction. (True or False)

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What is the use and over-utilization of surface and ground water?
- Or
- (b) Explain the equitable use of resources for sustainable life styles.
12. (a) Explain Aquatic ecosystem.
- Or
- (b) Explain the biogeographical classification of India.

13. (a) What are the urban problems related to energy.
Or
(b) Explain the role of Information Technology in Environment and human health.
14. (a) Describe radiation budget of the earth system.
Or
(b) State that atmospheric pressure decreases with height above sea level.
15. (a) Explain the interpretation of wind rose.
Or
(b) Define the following :
(i) Rain
(ii) Drizzle
(iii) Hail.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain mineral resources.
Or
(b) Explain renewable and non-renewable energy resources.
17. (a) Explain forest and desert ecosystem.
Or
(b) Explain the conservation of biodiversity.
18. (a) Explain solid waste management.
Or
(b) What is climate change, global warming and ozone layer depletion?

19. (a) Explain the different layers of atmosphere.

Or

(b) Write about the effect on insolation of a variation in sun's declination.

20. (a) Describe the method of estimating the wind direction from the appearance of the sea surface.

Or

(b) Describe the base heights of the principal cloud types.

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11643

B.Sc. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Nautical Science

NAVIGATION — III

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. The value of equation of time is taken from _____
(a) Nautical tables (b) Chronometer
(c) Nautical Almanac (d) Star Atlas
2. The International Date line is approximately located at _____ longitude.
(a) 180° (b) 0°
(c) 90° (d) 45°
3. The true amplitude is used to determine _____
(a) Latitude (b) Time of sunrise
(c) Compass error (d) Speed
4. Azimuth is calculated using
(a) Time (b) Latitude
(c) Declination (d) All the above

5. The main navigational use of Polaris is to find _____
- (a) Longitude (b) Compass error
(c) Latitude (d) Time
6. If the altitude of Polaris is 40° , then the approximate latitude of the observer is _____
- (a) 50° (b) 30°
(c) 40° (d) 60°
7. Co-latitude is calculated as _____
- (a) $90^\circ + \text{latitude}$ (b) $180^\circ - \text{latitude}$
(c) $180^\circ + \text{latitude}$ (d) $90^\circ - \text{latitude}$
8. Circle of Position is obtained from
- (a) GPS reading
(b) Observed altitude of celestial bodies
(c) Depth soundings
(d) Magnetic variation
9. Which twilight is best suited for star identification in navigation?
- (a) Civil twilight
(b) Nautical twilight
(c) Astronomical twilight
(d) Meridian twilight
10. A body is said to be circumpolar if it _____
- (a) Rises and sets
(b) Never rises above the horizon
(c) Is visible only at noon
(d) Is always above the horizon throughout the day

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Define sidereal day and state that it is a fixed time interval.

Or

- (b) Define zone time, standard time and international date line.

12. (a) What is the difference between true amplitude and compass amplitude?

Or

- (b) Derive the formula $\sin \text{amp} = \sin \text{decl.} \sec \text{lat.}$

13. (a) What are the corrections applied to Polaris altitude when calculating latitude?

Or

- (b) How will you identify major constellations?

14. (a) Define Geographical position and circle of position.

Or

- (b) How position line is used in navigation?

15. (a) Determine whether a star of declination $+65^\circ$ is circumpolar for an observer at latitude 30°N .

Or

- (b) Define Nautical and Astronomical twilights.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) How will you recognize important stars with reference to stellar constellations and stellar magnitudes?

Or

- (b) How will you determine ET from the almanac and its sign of application?

17. (a) What is amplitude in celestial navigation? Describe how to calculate the true amplitude of a celestial body.

Or

- (b) How is the compass error determined using azimuth observation? Describe the procedure and necessary corrections.

18. (a) What is the relation between the altitude of the Polaris and the observer's latitude?

Or

- (b) How will you find the latitude of the observer?

19. (a) Describe the process to calculate the position of an observer using the altitude and azimuth of Polaris.

Or

- (b) Explain the concept of intercept method and how it helps in position fixing.

20. (a) An observer is at latitude 40°N . On a certain day, the sun's declination is $+20^{\circ}$. Calculate the duration of civil twilight in minutes using the solar depression angle of 6° .

Or

- (b) Define circumpolar body and what are the conditions necessary for a body to be circumpolar?

C-7489

Sub. Code

11644

B.Sc. DEGREE EXAMINATION, APRIL 2026.

Fourth Semester

Nautical Science

SHIP STABILITY – II

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. _____ is considered when calculating trim.
 - (a) Centre of Buoyancy
 - (b) Centre of floatation
 - (c) Metacentre
 - (d) None

2. _____ is used to maintain constant mean draft while loading/ discharging.
 - (a) Change of trim
 - (b) Change of KG
 - (c) Change of density
 - (d) None

3. Cross curves of stability are used to find GZ values for various
 - (a) Drafts
 - (b) GM values
 - (c) Angles of heel
 - (d) Displacements

4. _____ gives values for righting lever for different angles of heel.
- (a) Cross curves (b) KN curves
(c) GZ curves (d) None
5. Simpson's rule is used to calculate
- (a) Freeboard (b) Heel angle
(c) Rolling moment (d) Area or volume
6. Which Simpson's rule uses the formula: $\left(\frac{3}{8}\right)$ rule?
- (a) First rule (b) Second rule
(c) Third rule (d) Modified rule
7. Angle of loll occurs due to
- (a) Excessive trim (b) Positive GM
(c) Negative GM (d) None
8. Angle of loll can be corrected by _____ to correct GM.
- (a) Adding (b) Removing
(c) Shifting (d) Ballasting
9. Which parameter changes when a ship moves from saltwater to freshwater?
- (a) LCG (b) FWA
(c) TPC (d) KM
10. Formula for FWA = _____
- (a) Displacement / TPC
(b) Volume/ GM
(c) (Displacement \times Density difference)/ TPC
(d) Draft/ GM

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the change of underwater volume due to change in density.

Or

- (b) Explain the changes in the position of COG and COB.

12. (a) Explain KN Cross Curves of stability.

Or

- (b) Explain Angle of Vanishing stability.

13. (a) Explain Angle of Repose and Volumetric Heeling Moment.

Or

- (b) Explain Simpson's First Rule.

14. (a) Derive the formula for calculating BM (transverse).

Or

- (b) Explain the danger to a ship at the angle of loll.

15. (a) M.V. Hindship, displacing 7720 tonnes KG 842m, no FSC, loads 330 tonnes, Kg 10.52 and Cg 2m off the centre line to starboard. Calculate the resultant list.

Or

- (b) M.V. Hindship, floating at a displacement of 13750 tonnes Kg 6.2m, FSC 0,12m, is listed $1\frac{1}{2}$ to starboard. Find the amount of Cargo to be loaded in No.4 TD 6m off the centre line to bring the vessel upright.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Calculate the location of COG, COB and COF.
Or
(b) Calculate the changes of drafts and Trim due to loading, discharging and shifting weights.
17. (a) Obtain Dynamic stability by computing area under the GZ curve upto given angle using Simpson's rule.
Or
(b) Sketch showing how the GZ curve for vessel with a zero GM is affected by a rise in the vessels KG.
18. (a) Determine by stability calculations whether the strip satisfies the requirements of stability criteria as specified in SOLAS 74.
Or
(b) Use Atwood's formula to obtain GZ value at moderate and large angles of heel.
19. (a) Derive Atwood's formula for calculating GZ at moderate or large angles of heel.
Or
(b) Explain in detail with diagram, how a vessel takes to angle of loll.
20. (a) M.V. Hindship floating in water RD 1.025 at a draft of F 7.23m, A 7.93m, loads 940t and sails to another part consuming 130t of fuel and TW. Find her arrival hydrostatic draft at the second part in water RD 1.009.
Or
(b) M.V. Hindship at a hydrostatic draft of 5.76 m is FW is listed 0°50' to port KG 7.68 m, FSC 0.09 m. A parcel of cargo weighing 80t is shifted from 1 m to port of CL to 4.5 m off the CL to port. Calculate the final list.

C-7490

Sub. Code

11645

B.Sc. DEGREE EXAMINATION, APRIL 2026.

Fourth Semester

Nautical Science

CARGO OPERATION – II

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. _____ is used to prevent shifting of deck cargo during transit.
 - (a) Ballast water
 - (b) Hatch cover
 - (c) Dunnage
 - (d) Radar system

2. Who is responsible for inspecting cargo handling gear on ships?
 - (a) Dock safety inspector
 - (b) Chief Engineer
 - (c) Deck officer
 - (d) None

3. _____ type of bulk cargo is prone to spontaneous combustion.
 - (a) Metal ores
 - (b) Dry bulk
 - (c) Concentrates
 - (d) Coal

4. According to IMSBC code, what kind of cargoes are liable to shift and liquefy.
- (a) Timber (b) Concentrates
(c) Steel coils (d) None
5. The purpose of using shifting boards in grain cargoes is to prevent _____
- (a) Cargo shifting during transit
(b) humidity inside the hold
(c) pests from entering the grain
(d) None
6. _____ due to shifting is the danger of not trimming grain cargo properly.
- (a) Overheating
(b) Loss of stability
(c) Damage
(d) None
7. What document provides proof of cargo delivery?
- (a) Mate's receipt (b) Charter party
(c) MSDS (d) Loadicator
8. _____ damage can occur during the tallying of timber cargo.
- (a) Overloading (b) Water leakage
(c) Pest infestation (d) Third-party
9. IMDG stands for International Maritime _____
- (a) Dangerous goods (b) Dock guide
(c) Deck guide (d) None

10. MSDS sheet is used for providing _____
- (a) Cargo owners
 - (b) Chemical safety data
 - (c) Crew duties
 - (d) None

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the importance of checking and method of checking Bilge suction.
Or
(b) Explain the need and importance of inspection of holds.
12. (a) Discuss the protection of deck machinery from dust.
Or
(b) Discuss the main hazards and precautions with the shipment of bulk solids.
13. (a) Write the Grain loading stability criteria for ships with and without a DOA.
Or
(b) Explain the uses of shifting boards bundling arrangements.
14. (a) Explain the need for provision of walkaways and access to the top of the cargo.
Or
(b) Explain the hazards involved with the carriage of deck timber cargo.
15. (a) Explain the limitations on carriage of explosives.
Or
(b) Write the uses of IMDG code and cargo information.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain the different types of Deck Cargoes.
Or
(b) Explain the maintenance and requirements for initial and periodic testing of cargo gear and annealing.
17. (a) Explain BLU code: Purpose and objectives of bulk carrier loading and unloading.
Or
(b) Explain the types of bulk cargoes.
18. (a) Describe the common damage/ defects that may occur on watertight transverse bulkheads.
Or
(b) Explain the contents of Grain Code and preparation of holds for carriage of grain cargo.
19. (a) Explain the rolling period test for determining ship's stability and its limitations.
Or
(b) Write the procedure in detail for receiving, tallying and delivering cargo.
20. (a) Explain the classification, structure and uses of IMDG code.
Or
(b) Explain the precautions during storage, handling, loading and carriage of explosives.
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C-7491

Sub. Code

11647

B.Sc. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Nautical Science

**MARINE ENGINEERING, AUTOMATION AND
CONTROL SYSTEMS – II**

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. _____ is the key component of a diesel engine?
 - (a) Carburetor
 - (b) Spark plug
 - (c) Fuel Injector
 - (d) Magneto

2. Fixed pitch and variable pitch propellers differ in _____.
 - (a) Blade angle adjustment
 - (b) Length
 - (c) Weight
 - (d) Rotation speed

3. The function of the bilge water separator is to separate _____.
 - (a) solid waste
 - (b) oil from water
 - (c) cool engine
 - (d) air and fuel

4. MCR in engine performance stands for
- (a) maximum continuous rating
 - (b) maximum control rating
 - (c) minimum continuous rating
 - (d) minimum control rating
5. _____ used for inerting cargo tanks.
- (a) Oxygen
 - (b) Carbon di oxide
 - (c) Hydrogen
 - (d) Inert gas
6. In a rotary vane steering gear, the vanes are housed within a _____.
- (a) fixed housing
 - (b) propeller
 - (c) fixed cylinder
 - (d) rotating shaft
7. A windlass is primarily used for _____ the anchor.
- (a) steering
 - (b) mooring
 - (c) lifting and lowering
 - (d) none
8. _____ winch maintains constant tension in mooring lines?
- (a) Electric
 - (b) Constant tension
 - (c) Manual
 - (d) Drum
9. _____ is a clean alternative fuel increasingly used in ships.
- (a) Heavy fuel oil
 - (b) Diesel
 - (c) LNG
 - (d) Kerosene
10. Non-corrosive nature is a desirable property of a _____.
- (a) Refrigerant
 - (b) Ship
 - (c) Engine system
 - (d) Ventilation

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe the components of Diesel Engine.

Or

- (b) Explain the requirements of main and auxillary engine on board.

12. (a) Describe the purpose of turbocharger and procedures of turbo charger washing.

Or

- (b) Describe different types of exhaust gas turbo charging arrangement.

13. (a) Explain with diagram electric steering.

Or

- (b) Explain O₂ analyser and explosivemeter.

14. (a) Explain with diagram the working of a butterfly valve.

Or

- (b) Explain with diagram the working of a globe valve.

15. (a) Explain the need of clean and alternate fuel.

Or

- (b) List down the safety checks to be carried out in a port.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain with diagram the working principle of steam turbine.

Or

- (b) Explain p-v diagrams of two stroke diesel engine and its significance.

17. (a) Explain hydraulic and electrical control system.

Or

- (b) Explain the open loop and close loop control system.

18. (a) Explain with diagram inert gas production from boiler exhaust gas.

Or

- (b) Explain with diagram a two ram electro hydraulic steering gears.

19. (a) Explain with diagram a typical bilge and ballast system for a dry Cargoship.

Or

- (b) Explain with diagram the working of a Windlass.

20. (a) Explain the requirements of efficient ventilation system for a ship.

Or

- (b) Explain with diagram a vapour compression system.

C-7492

Sub. Code

11648

B.Sc. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Nautical Science

METEOROLOGY

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. The change of water into vapor at any temperature is called _____
 - (a) evaporation
 - (b) condensation
 - (c) sublimation
 - (d) latent heat of vaporization

2. What is the main cause of radiation fog?
 - (a) warm air moving over cold water
 - (b) sea spray
 - (c) cooling of the land at night
 - (d) dust storms

3. A cold front forms when _____
 - (a) warm air rises gently over warm land
 - (b) warm air overtakes cold air mass
 - (c) cold air pushes beneath a warmer air mass
 - (d) two similar air masses mix

4. Which of the following features is typically associated with calm and settled weather?
- (a) Trough (b) Ridge
(c) Col (d) Low pressure
5. A Tropical Revolving Storm (TRS) is also known as _____
- (a) Cyclone (b) Typhoon
(c) Hurricane (d) All the above
6. In the Northern Hemisphere, winds around an anticyclone move _____
- (a) Clockwise and inward
(b) Counterclockwise and inward
(c) Clockwise and outward
(d) Counterclockwise and outward
7. What is the main cause of surface ocean currents?
- (a) Wind patterns (b) Solar radiation
(c) Coriolis force (d) Both (a) and (c)
8. What is sea ice?
- (a) Ice formed from freshwater rivers
(b) Icebergs drifting in the ocean
(c) Ice formed by the freezing of ocean water
(d) Ice formed by condensation of water vapor
9. Which instrument is used to measure atmospheric pressure?
- (a) Hygrometer (b) Aneroid Barometer
(c) Anemometer (d) Psychrometer

10. Anemometer is used to measure _____
- (a) Humidity (b) Wind speed
(c) Rainfall (d) Cloud Height

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the formation of anabatic and kotabatic winds.

Or

- (b) Describe the properties of water vapour in the atmosphere.

12. (a) Explain the formation of an air mass.

Or

- (b) Explain isobaric patterns on weather charts.

13. (a) What are the actions to be taken when the presence of TRS is confirmed?

Or

- (b) Describe the weather associated with anticyclones.

14. (a) What are the properties of ocean water?

Or

- (b) Explain the characteristics of ocean currents.

15. (a) What is the use of Barograph?

Or

- (b) Explain the principle of Hydrometer?

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain wind and pressure systems over the oceans.

Or

- (b) Explain qualitatively the formation of advection fog and reasons for dispersal.

17. (a) Describe World Meteorological Organization.

Or

- (b) Explain how weather observations at a ship can be used to improve the forecast derived from synoptic and prognostic chart.

18. (a) Explain the origin, structure, movement and lifespan of TPS.

Or

- (b) Draw a synoptic pattern for a ride showing isobars and wind directions.

19. (a) Explain the types of waves.

Or

- (b) Describe icebergs and its limits.

20. (a) Explain the principle, use and operation of Aneroid Barometer.

Or

- (b) Write about Whirling Psychrometer.

C-7493

Sub. Code

11649

B.Sc. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Nautical Science

CYBER SECURITY, INTERNET OF THINGS

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. Cyber Attack means _____
 - (a) Unauthorized access to data
 - (b) Upgrading software
 - (c) Sending an email
 - (d) None

2. Hackers who exploit systems for malicious purposes are _____
 - (a) officials
 - (b) ethical hackers
 - (c) Black Hat Hackers
 - (d) None

3. _____ is a web application vulnerability.
 - (a) HTML
 - (b) SQL Injection
 - (c) CSS
 - (d) HTTPS

4. Multi-factor authentication is a safeguard against _____
- (a) Hacking (b) Upgrading
(c) Cyber security (d) None
5. Tracking cyber criminals and gathering digital evidence is the purpose of _____
- (a) Cyber attack (b) Hacking
(c) Cyber forensics (d) None
6. Cyber forensics helps to investigate and prevent _____
- (a) Cyber crimes (b) Cyber attack
(c) Hacking (d) None
7. _____ is an application of IoT.
- (a) cooking (b) smart home automation
(c) Handwriting (d) None
8. Data privacy and unauthorized access is main challenges in _____
- (a) IoT (b) Cyber security
(c) Hacking (d) None
9. _____ is a benefit of IoT in the maritime industry.
- (a) Painting ships
(b) Tracking cargo and ship safety
(c) Ship Decoration
(d) None

10. M2M stands for _____ in IoT.
- (a) Machine to Machine
 - (b) Main to Man
 - (c) Man to Machine
 - (d) None

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain cyber security terminologies.

Or

- (b) Describe cyber security and its uses.

12. (a) Explain Web Applications and servers.

Or

- (b) Explain cyber security vulnerabilities.

13. (a) Discuss about cyber forensics.

Or

- (b) Explain the different measures to protect against cyber fraud.

14. (a) Explain IoT and Big Data.

Or

- (b) Explain IoT and its evolution.

15. (a) Explain different IoT applications in shipping industries.

Or

- (b) Explain IoT in everyday life.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain cyber security, its types, advantages and disadvantages.

Or

- (b) Explain the different types of Web and cyber attacks.

17. (a) Explain in detail intrusion Detection, its prevention and uses.

Or

- (b) Explain how to secure Web Application, services and servers.

18. (a) Explain and demonstrate general firewall setting.

Or

- (b) Analyze and Explain cyber attacks and cyber netiquettes.

19. (a) Explain in detail the challenges in IoT with respect to marine domain.

Or

- (b) Explain M2M, IoT and Big Data.

20. (a) Explain IoT in every day life and the IoT standards in practice and IoT cloud services.

Or

- (b) Describe and Explain IoT and individual privacy.

C-7494

Sub. Code

116410

B.Sc. DEGREE EXAMINATION, APRIL 2026

Fourth Semester

Nautical Science

BLOCK CHAIN TECHNOLOGY

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. Block Chain Technology primarily ensures _____
 - (a) tamper proof transactions
 - (b) faster printing
 - (c) single user
 - (d) None

2. Cryptographic elements in Block chain help to _____ and ensure transactions.
 - (a) format data (b) encrypt data
 - (c) improve audio (d) None

3. _____ best describes a block chain platform.
 - (a) decentralized ledger technology
 - (b) cloud computing
 - (c) main frame
 - (d) None

4. Block chain platforms are mainly used to execute _____
- (a) video files (b) decentralized applications
(c) create antivirus (d) None
5. Cypher punks are developers advocating _____
- (a) cryptographic privacy
(b) game designers
(c) Hackers
(d) None
6. Mining in block chain involves solving cryptographics _____
- (a) emails (b) videos
(c) puzzles (d) problems
7. _____ is a consensus algorithm.
- (a) proof-of-work (b) proof-of-document
(c) storage format (d) None
8. _____ is prevented in block chain by cryptographic hash functions.
- (a) water marking (b) block tampering
(c) physical seals (d) None
9. An opportunity of block chain in the maritime sector is reducing _____.
- (a) Human error (b) middle men
(c) Paperwork (d) None

10. _____ is a limitation of block chain in marine industry.
- (a) Enhanced visibility
 - (b) High energy consumption
 - (c) increased accuracy
 - (d) None

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Write five use-cases of block chain technology.
- Or
- (b) What are the various application areas of block chain technology? Discuss in detail.
12. (a) Describe the current state of the block chain landscape.
- Or
- (b) Explain in detail the different types of block chain.
13. (a) Describe the task of miners in block chain network.
- Or
- (b) How do block chains use private and public key cryptography?
14. (a) Explain in detail Block chain architecture.
- Or
- (b) Explain Block Mining.
15. (a) Explain the best use cases of smart contracts and characteristics of hyper ledger network.
- Or
- (b) How does block chain technology benefit the insurance industry?

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain the technological and cryptographic element in block chain.

Or

- (b) With a neat diagram explain the genetic structure of a block.

17. (a) Discuss the requirements and operations of a decentralized application.

Or

- (b) Describe the business applications and how to assess block chain.

18. (a) Explain mining and consensus produce in block chain.

Or

- (b) Explain crypto-Anarchism and cypherpunks.

19. (a) Explain in detail block mining and block tampering.

Or

- (b) Describe the proof- of work consensus algorithm.

20. (a) Describe the opportunities and challenges of block Chain in marine industry with its advantages.

Or

- (b) Explain block chain based IoT model.
-

C-7501

Sub. Code

11661

B.Sc. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Nautical Science

VOYAGE PLANNING & ECDIS

(2023 onwards)

(BA Chart 5049/5047/5048/2675)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. Which of the following is NOT typically considered during voyage planning?
 - (a) Ship type and draft
 - (b) Port charges
 - (c) Ocean current
 - (d) Navigational Hazards
2. TSS stands for
 - (a) Traffic separation system
 - (b) Tide signal scheme
 - (c) Traffic safety system
 - (d) Track survey scheme
3. Ship reporting systems are part of
 - (a) GMDSS
 - (b) ISPS code
 - (c) Ballast water management system
 - (d) International convention on load lines

4. The primary use of VTS is to
 - (a) Track cargo movement
 - (b) Provide weather routing
 - (c) Monitor and guide vessel traffic
 - (d) Conduct crew changes

5. The primary objective of weather routing is
 - (a) Improve fuel efficiency
 - (b) Reduce cargo handling time
 - (c) Ensure vessel safety
 - (d) Both (a) & (c)

6. Which of the following is essential for planning and executing a coastal passage?
 - (a) Tidal and current information
 - (b) List of dry dock facilities
 - (c) Shore leave arrangements
 - (d) Crew accommodation size

7. Which of the following chart is used in ECDIS?
 - (a) Raster weather chart
 - (b) Manual paper chart
 - (c) Port security map
 - (d) ENC

8. Which of the following is not a component of ECDIS?
 - (a) position sensors
 - (b) Depth sounder
 - (c) Radar feed
 - (d) Chart correction logbook

9. Which international regulation governs the GMDSS framework?
- (a) SOLAS (b) MARPOL
(c) STCW (d) ISPS
10. The international body responsible for regulating radio frequencies is _____
- (a) IMO (b) ILO
(c) ITU (d) SOLAS

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) How will you plot courses on the charts?

Or

- (b) Explain navigational hazards.

12. (a) Explain INSPIRES.

Or

- (b) Explain the actions of receiving storm warning.

13. (a) What is the use of wave charts?

Or

- (b) Explain navigation in pilotage waters.

14. (a) What are the advantages of ECDIS?

Or

- (b) What are the differences between raster chart and vector chart.

15. (a) Explain regulation theory.

Or

- (b) Explain world wide navigational warning system.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) How will you prepare a voyage plan document?

Or

- (b) Explain how to plan a passage between two ports from berth to berth using the procedures for passage planning.

17. (a) Explain VTS reporting procedures.

Or

- (b) Explain bridge resource management principles of obtaining and maintaining situational awareness.

18. (a) Explain shore based weather routeing.

Or

- (b) Explain the planning and execution of a costal passage.

19. (a) What are the components of ECDIS?

Or

- (b) Explain traditional and simplified symbols.

20. (a) Explain the uses of the contents of the ocean passage of the world.

Or

- (b) Explain the uses of the contents of list of light and fog signals.
-

C-7502

Sub. Code

11662

B.Sc. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Nautical Science

NAVAL ARCHITECTURE - II

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. Loss of Metacentric height (GM) during dry docking occur due to
 - (a) Increase in load
 - (b) Reduction of buoyancy
 - (c) Removal of ballast
 - (d) Addition of weight at the deck

2. What happens of the vessel is not properly aligned during dry docking?
 - (a) structural stress
 - (b) Rudden failure
 - (c) Hull damage
 - (d) Both (a) & (c)

3. The bending moment is maximum when
 - (a) Shear force is maximum
 - (b) Shear force is minimum
 - (c) At the midpoint always
 - (d) Shear force is zero

4. A negative Shear force indicates _____ force to the right of the section.
- (a) upward (b) downward
(c) No force (d) Twisting moment
5. What is the primary objective of an inclining experiment?
- (a) To measure ships length
(b) To determine displacement
(c) To calculate light ship KG
(d) To find draft of the ship
6. The purpose of a loadicator on board a ship is
- (a) Measure temperature of cargo
(b) To monitor hull stress
(c) Calculate SF and BM
(d) Both (b) & (c)
7. Which type of vessel is the subdivision factor especially important for?
- (a) Cargo ships (b) Oil tankers
(c) Passenger ships (d) Tugboats
8. Criterion numeral in ship design is related to _____
- (a) Flooding survival capability of a ship
(b) Number of compartments in a ship
(c) Assessment of structural strength
(d) Maximum ship speed in knots
9. The primary cause of corrosion in steel is due to _____
- (a) Exposure to sunlight
(b) Reaction with oxygen and moisture
(c) Magnetic fields
(d) overheating in the engine room

10. During a class survey, which of the following areas is typically inspected?
- (a) Kitchen equipment
 - (b) Crew's nationality
 - (c) Onboard entertainment system
 - (d) Structural integrity of hull

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) A vessel of displacement 10,000 tonnes has a length between perpendiculars (LPP) of 150m. During dry docking the moment to change trim by 1 cm (MCT 1 cm) is 100 tonne-meters. Calculate the loss in metacentric height(GM) when the vessel is supported only at the keel during the critical instant.

Or

- (b) Explain the importance of trim during dry – docking.

12. (a) Define positive and negative shear force.

Or

- (b) State the hazards on exceeding bending moment.

13. (a) Explain documents for the following.

- (i) Class certificate
- (ii) Class approved loading manual

Or

- (b) Explain the objective of inclining experiment.

14. (a) Define criterion of service manual.

Or

- (b) Describe the use of cross-flooding fittings.

15. (a) Explain impressed current system.

Or

(b) Define substantial corrosion and corrosion prevention system.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain the terms critical period and critical instant during dry-docking. How do they affect the ship's stability.

Or

(b) Explain dry-docking process.

17. (a) Explain bending moment of a box shaped vessel.

Or

(b) Describe the effect of increasing the beam and ship's stability with the help of GZ curve.

18. (a) Explain inclining experiment.

Or

(b) Explain likelihood of overstressing hull structure when loading certain bulk cargoes.

19. (a) Define the following.

(i) Floodable length

(ii) Permissible length

(iii) Factor of subdivision

Or

(b) Describe stability criteria for passengers ship in damaged condition.

20. (a) Explain various types of corrosion experienced by ships.

Or

(b) Explain the role and functions of classification societies.

C-7503

Sub. Code

11663

B.Sc. DEGREE EXAMINATION, APRIL 2026.

Sixth Semester

Nautical Science

SHIP MAINTENANCE & EMERGENCIES

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. _____ is used to measure dry paint thickness?
 - (a) Thermometer
 - (b) Ultrasonic meter
 - (c) Paint gauge
 - (d) None

2. _____ Paint is typically used on the ship's underwater hull.
 - (a) Emulsion
 - (b) Acrylic
 - (c) Antifouling
 - (d) None

3. _____ is used to detect internal defects in welds.
 - (a) Micrometer
 - (b) Vernier Caliper
 - (c) Ultrasonic tester
 - (d) None

4. _____ is checked for leakage and cargo damage.
- (a) Cargo hold
 - (b) Mast
 - (c) Funnel
 - (d) Lifeboat
5. _____ must be checked before entering the dry dock.
- (a) Valves and sea chest
 - (b) Bilge pumps
 - (c) Bridge Equipment
 - (d) None
6. Fumigation should be carried out in crew accommodation _____
- (a) During and after cleaning
 - (b) Every week
 - (c) Before docking
 - (d) None
7. _____ Survey ensures the safety construction standards of ship.
- (a) SEQ
 - (b) Safety construction
 - (c) IQPP
 - (d) Loadline
8. Ventilators and watertight doors are checked during a _____ survey.
- (a) SEQ
 - (b) Safety construction
 - (c) IQPP
 - (d) Loadline

9. Role of _____ in rescue operations is to home into the location of the man onboard.
- (a) Compass (b) Wind
(c) GPS (d) None
10. _____ turn is used for man overboard recovery
- (a) Compass (b) Williamson
(c) Spiral (d) Triple

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the purpose of a Binder, a pigment and a solvent in the paints.
Or
(b) Explain the dangers of excess lubrication.
12. (a) Describe the various emergencies and actions to be taken in grounding and beaching.
Or
(b) Explain the precautions for the protection and safety of passengers in emergency situations.
13. (a) List out the various ship plans used during dry dock.
Or
(b) Explain the checks to be made prior to flooding of dry dock.
14. (a) Explain LSA/FFA items in SEQ survey.
Or
(b) Explain: Emergency fire pumps, fire flaps and portable fire extinguishers maintenances.
15. (a) Describe the precautions to be taken while manoeuvring the ship prior to the launching of lifeboat or rescue boats.
Or
(b) Explain the immediate actions to be taken in case of a man overboard while manoeuvring.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Describe the action of Anodic primers and resistance type primers.

Or

- (b) List out the common types of paints and their area of application along with advantages and disadvantages.

17. (a) Explain hose testing and ultrasonic testing for the weather tightness of hatch covers.

Or

- (b) Describe the procedure for abandoning ships.

18. (a) Describe the cleaning, preparation and painting of the hull in the dry dock.

Or

- (b) Describe the examinations to be made in Echo sounder, Rudder, Propeller and Doppler fittings.

19. (a) Explain: S.C.B.A sets, emergency generator and fire detection equipments maintenances.

Or

- (b) Explain GMDSS equipment.

20. (a) Describe procedures and precautions during Helicopter operations.

Or

- (b) Describe the various types of turns used for rescuing man overboard.

C-7504

Sub. Code

11664

B.Sc. DEGREE EXAMINATION, APRIL 2026.

Sixth Semester

Nautical Science

**SHIP HANDLING & COLLISION PREVENTION
REGULATIONS**

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. What is the term for the anchor ready for letting go?
 - (a) Short stay
 - (b) A'Cockbill
 - (c) Yawing
 - (d) None

2. Standing moor and running moor are types of _____
 - (a) Anchoring procedures
 - (b) Mooring
 - (c) Windlass
 - (d) None

3. Wind, current and draught affects the _____ of a ship.
 - (a) Mooring
 - (b) Position
 - (c) Turning circle
 - (d) None

4. _____ is the interaction between ship and banks.
- (a) Canal effect (b) Wind drag
(c) Propeller (d) None
5. Which year COLREGS amended as per the unit?
- (a) 1982 (b) 1972
(c) 2000 (d) 1995
6. COLREGS helps to prevent _____
- (a) Collisions at sea (b) Water Pollution
(c) Fire onboard (d) None
7. _____ is essential for navigation in restricted visibility.
- (a) Compass (b) Radar
(c) Echosounder (d) Anemometer
8. _____ is used for safe navigation in restricted visibility.
- (a) Blind Pilotage (b) RADAR
(c) GPS plotting (d) Visual bearings
9. One of the contingency plans for beaching should include:
- (a) Abandoning ship
(b) Reducing speed
(c) Dropping all anchors
(d) None
10. Stop the ship and inform the bridge team in case of a _____
- (a) Steering failure (b) Bilge keels
(c) Abandoning ship (d) None

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain the markings on Anchor cable and the uses of Bow stopper.

Or

- (b) Explain the use of correct terminology for communication between bridge and anchor station crew.

12. (a) Explain Manoeuvring data of ship advance & transfer.

Or

- (b) Explain the reduction in under keel clearance due to rolling and pitching.

13. (a) Explain the hierarchy of vessels in terms of responsibility to keep clear.

Or

- (b) Explain: Sailing vessel, NUC, Vessel, power-driven vessel.

14. (a) Explain the Basic ship handling in ice.

Or

- (b) List the contents of polar code.

15. (a) Explain the action to be taken while parting of moorings at berth.

Or

- (b) Explain the action to be taken while spills of dangerous goods.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Describe parts of anchor used on ships.

Or

(b) Explain the procedures for anchoring in deep water and in shallow water.

17. (a) Explain the effects of various deadweights, draughts, trim on turning circles and stopping distances.

Or

(b) Explain safe practices during mooring operation.

18. (a) Describe the positioning, spacing and screening of lights.

Or

(b) Explain: Rule 34 and Rule 35.

19. (a) Describe the procedures for embarkation and disembarkation of pilot.

Or

(b) Explain sighting and reporting of ice, working through ice, navigation in ice.

20. (a) Explain the actions to be taken as per contingency plans in the emergency collision and steering failure.

Or

(b) Explain the best management practices for protection against piracy.

C-7505

Sub. Code

11665

B.Sc. DEGREE EXAMINATION, APRIL 2026.

Sixth Semester

Nautical Science

IMO & INTERNATIONAL CONVENTIONS

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. Which of the following conventions is focused on standards for training and certification of seafarers?
(a) MARPOL (b) SOLAS
(c) STCW (d) MLC
2. IMO was established by United Nations in which year?
(a) 1948 (b) 1958
(c) 1968 (d) 1978
3. The merchant shipping Act covers _____
(a) Maritime safety (b) Seafarer welfare
(c) Ship registration (d) All the above
4. The 'High Seas' begin after the limit of _____
(a) 12 NM (b) 24 NM
(c) 200 NM (d) 20 NM

5. Which authority is responsible for enforcing the MS Act in India?
- (a) Indian Coast guard
 - (b) Ministry of Ports
 - (c) Director general of shipping
 - (d) Indian Maritime University
6. Which zone allows full sovereignty of the coastal state?
- (a) Territorial sea (b) High sea
 - (c) Contiguous zone (d) EEZ
7. Which year was the STCW convention originally adopted?
- (a) 1974 (b) 1978
 - (c) 1982 (d) 1985
8. ISM stands for _____
- (a) International safety management
 - (b) International safety manual
 - (c) International seafarers manual
 - (d) International ship management
9. Who is responsible for implementing the ship security plan on board?
- (a) SSO (b) CSO
 - (c) PFSO (d) Either (b) or (c)
10. Which of the following is the key element of ISPS code?
- (a) Risk management Manual
 - (b) Emergency Towing Arrangements
 - (c) Continuous synopsis record
 - (d) Security levels

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Describe flag state jurisdiction.

Or

(b) Distinguish between private and public international law.

12. (a) Explain section 20 to 28.

Or

(b) Explain section 88 to 95.

13. (a) What is Exclusive Economic Zone?

Or

(b) Explain the law of the sea Tribunal.

14. (a) Describe the control which may be exercised by a duly authorized control officer.

Or

(b) Explain the impact and practice of Risk management.

15. (a) What is the purpose of LLMC?

Or

(b) Explain the purpose of International convention on salvage 1982.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain SOLAS, MARPOL, STCW.

Or

- (b) Explain IMO conventions.

17. (a) What are elements of Indian Merchant shipping act, 1958, section 360 to 380.

Or

- (b) Explain the section 50 to 68 of Indian Merchant Shipping act.

18. (a) Explain legal jurisdictions and Freedoms in various zones.

Or

- (b) Describe UNCLOS.

19. (a) Explain International convention on Standard of Training and certification.

Or

- (b) What are the functions of international safety management (ISM) code?

20. (a) Explain International ship and port facility security code.

Or

- (b) Explain code of casualty investigation.

C-7506

Sub. Code

11667

B.Sc. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Nautical Science

**HUMAN RESOURCE DEVELOPMENT & SHIPPING
MANAGEMENT**

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. _____ is primarily responsible for handling cargo operations on board?
(a) Chief Engineer (b) Radio Officer
(c) Chief Officer (d) None
2. Shipbroker acts as a mediator between ship owners and _____.
(a) Crew (b) Ship
(c) Cargo owners (d) None
3. _____ is a contract for the hire of a ship.
(a) Charter party (b) Type of container
(c) Naval court (d) None
4. _____ is responsible for dispatch and demurrage calculations.
(a) Ship owner (b) Charterer
(c) Customs officer (d) None

5. _____ is not a function of human resource management.
- (a) Navigation (b) Training
(c) Recruitment (d) None
6. The key component of emotional intelligence at sea is controlling
- (a) multiple languages
(b) emotional reactions
(c) weather patterns
(d) none
7. _____ act is the recruitment and registration of seafarers governed in India.
- (a) MS Act 1975 (b) MS Act 1958
(c) Sea farers Ast (d) None
8. Main purpose of recruitment and placement rules 2005 is to ensure proper recruitment and welfare of _____.
- (a) Seafarers (b) Crew
(c) Charterer (d) None
9. _____ is not an effective communication skill at sea.
- (a) Clarify in instructions
(b) Listening actively
(c) Guessing intentions
(d) None
10. According to Maslow's Hierarchy which need is at the top?
- (a) Safety needs (b) Love and belonging
(c) Self-actualization (d) Esteem

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) Explain about Bunker and Store supplies and shipping agencies.

Or

- (b) Describe the functions and responsibilities of shipboard staff.

12. (a) Explain the terms, demurrage, dispatch, safe port and safe berth.

Or

- (b) Describe the limitations or liabilities as per the carriage of goods by Sea Act, 1925.

13. (a) Explain about the functions, requirement and selection of personnel.

Or

- (b) Describe the working conditions as per MLC.

14. (a) Describe the responsibilities of employer and seafarer in Indian ships.

Or

- (b) Explain the general content of agreement in foreign flagship.

15. (a) Describe the barriers to effective interpersonal communication in organizations.

Or

- (b) Explain the necessity of positive attitude and prioritization of resources.

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain the role of shipping companies and list out the types of shipping companies.

Or

- (b) Explain the role of superintendents and explain the functions of various departments in shipping company's office.

17. (a) Explain the common charter parties and the terms Freight and NOR.

Or

- (b) Explain in detail Hamburg and Rotterdam Rules.

18. (a) Explain about the mental gymnastics and creative problem solving techniques.

Or

- (b) Explain about the employer's liability for health and safety and their relation with trade union and workers participation in management.

19. (a) Explain the needs of foreign shipping companies to comply with RPSL rules.

Or

- (b) Explain the nature of the job at sea demands of the career technical, physical and psychological.

20. (a) Explain Maslow's Hierarchy of needs theory.

Or

- (b) Explain McGregor's Theory X and Theory Y.

C-7507

Sub. Code

11668

B.Sc. DEGREE EXAMINATION, APRIL 2026

Sixth Semester

Nautical Science

MARITIME RISK MANAGEMENT

(2023 onwards)

Duration : 3 Hours

Maximum : 75 Marks

Part A

(10 × 1 = 10)

Answer **all** questions.

1. What should be the first step in conducting a risk assessment?
 - (a) Identify hazards
 - (b) Implement control measures
 - (c) Evaluate risks
 - (d) Record the findings

2. Which document under international maritime law emphasizes onboard safety management including risk assessment?
 - (a) SOLAS
 - (b) ISM code
 - (c) MARPOL
 - (d) UNCLOS

3. Which tool helps visualize and prioritize hazards based on likelihood and severity?
 - (a) Helm chart
 - (b) Risk Matrix
 - (c) Load line
 - (d) MSDS sheet

4. Which type of hazard is excessive noise in the engine room?
(a) Chemical hazard (b) Biological hazard
(c) Physical hazard (d) Psychological hazard
5. Slippery deck surfaces on a wet day fall under _____ hazard.
(a) Physical (b) Psychological
(c) Ergonomic (d) Radiological
6. Which hazard category includes infections from bacteria or viruses onboard?
(a) Biological hazard
(b) Physics hazard
(c) Mechanical hazard
(d) Human error hazard
7. Risk is typically assessed based on which of the following criteria?
(a) Probability of occurrence
(b) Time of day
(c) Severity of consequence
(d) Both (a) and (c)
8. What is the primary reason for conducting hazard identification?
(a) To comply with ship certification rules
(b) To reduce crew wages
(c) To prevent accidents and incidents
(d) To increase paperwork
9. Which document is commonly used during the review of risk control measures?
(a) Ship's logbook (b) Cargo manifest
(c) Safety audit report (d) Radio log

10. Effective monitoring of risk control measures helps in _____.
- (a) Delaying operational schedules
 - (b) Reducing safety meetings
 - (c) Increasing paperwork only
 - (d) Continuous improvement of safety

Part B

(5 × 5 = 25)

Answer **all** questions, choosing either (a) or (b).

11. (a) What are the steps involved in risk assessment?
- Or
- (b) Describe the obligation of employee in maintaining health at workplace.
12. (a) List the types of hazards commonly found on board ships.
- Or
- (b) What is meant by substitution in hazard control?
13. (a) List out the items in Hazard checklist.
- Or
- (b) What are the common areas of hazard?
14. (a) How will you identify risk controls?
- Or
- (b) How will you estimate risk?
15. (a) How will you confirm whether the risks are tolerable?
- Or
- (b) How will you ensure risk assessment and controls are effective?

Part C

(5 × 8 = 40)

Answer **all** questions, choosing either (a) or (b).

16. (a) Explain the general principles of Risk Assessment and its importance in shipboard operations.

Or

- (b) Explain the role of safety culture in risk assessment and maritime operations.

17. (a) Explain the process of hazard identification in the maritime workplace.

Or

- (b) Explain the hazards which can be removed.

18. (a) Explain the categories of hazard.

Or

- (b) Explain the process of identifying hazard.

19. (a) What are the main elements of risk assessment?

Or

- (b) How will you determine the tolerability of the risk? Also explain the preparation of risk?

20. (a) Explain the control action plan to improve risk controls.

Or

- (b) Explain risk assessment exercise.