| C–4406 | Sub. Code |
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| | 11613 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**First Semester**

**Nautical Science**

**BASIC SHIP KNOWLEDGE**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** Questions.

1. Bilge keel is provided for the purpose of _____.

   (a) Elasticity (b) Stability

   (c) Equity (d) None

2. Draft Marking s indicate the submerged _____ of ship null.

   (a) Horizontal height (b) Vertical height

   (c) Length (d) None

3. The shell expansion drawing shows the thickness of the _____.

   (a) hull plates (b) Bilge keel

   (c) tank (d) None

4. In bulk carriers cargo discharged through _____.

   (a) Tanks (b) Grabs

   (c) Wheels (d) None

5. _____ is the other name of load line mark.

(a) Pilmsol mark (b) Deckline

(c) Bilge Radius (d) None

6. _____ carry wheeled cargo like car, etc.

(a) Carrier ship (b) Cargo RoRo ship

(c) Passenger ship (d) None

7. List is measured in _____.

(a) Celsius (b) temperature

(c) degree (d) None

8. Sparkling pipe leads chain from chain locker to the gypsy wheel in _____.

(a) Windlass (b) Cargo gear

(c) Deck house (d) None

9. Bitter end is the end of _____ chain.

(a) Ship (b) Windlass

(c) Anchor (d) None

10. Kenter shackle is used to connect the length of _____ chains.

(a) Ship (b) Anchor

(c) Windlass (d) None

**Part B** $(5 \times 5 = 25)$

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

11. (a) Describe the development of Modern Merchant ships.

Or

(b) Explain the existence of old Harbours and Need of Modern ports.

12. (a) Explain camber of Deck and sheer of Deck.

Or

(b) Explain

(i) Baseline

(ii) Bilge Radius and

(iii) Trim.

13. (a) Define

(i) Bow thrusters

(ii) Anchoring and Mooring Equipments.

Or

(b) Explain the purpose and location of workshops.

14. (a) Demonstrate the identification of plates with details.

Or

(b) Explain the purpose of Framing and Frame spacing.

15. (a) Describe the Time zone and international dataline.

Or

(b) Explain the impacts of areas of bad weather.

**Part C** $(5 \times 8 = 40)$

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

16. (a) Explain in brief the features and purpose of various types of ships.

Or

(b) Explain in brief the types of specialized vessels.

17. (a) Explain the loadline markings T,S,W,TF,F and WNA.

Or

(b) Explain the terms

(i) Sheer of deck,

(ii) Flare of Bows,

(iii) Baseline

(iv) Stern and

(v) Trim.

18. (a) Describe the layout of Engine Room.

Or

(b) Explain Bulk carrier, oil Tanker and container ships.

19. (a) Describe shell expansion plan and its uses.

Or

(b) Sketch and explain various types of Air pipes.

20. (a) Describe the climatic features affecting shipping.

Or

(b) Explain the impact of sea water Density, Time zone and loadline zones on ships and shipping.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**First Semester**

**Nautical Science**

**NAUTICAL MATHEMATICS –I**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Section A** $(10 \times 1 = 10)$

Answer **all** questions.

1. The surface of the sphere whose plane does pass through the centre of the sphere is ————————.

   (a) Small circle (b) Sphere

   (c) Great circle (d) None

2. The maximum angle of a spherical triangle is ————————.

   (a) 180° (b) 90°

   (c) 45° (d) None

3. If $u = f\left(\frac{y}{x}\right)$, then $x \cdot \frac{\partial u}{\partial x} + y \cdot \frac{\partial u}{\partial y} =$————————.

   (a) 1 (b) 0

   (c) $r$ (d) None

4. If $u = x^y$, then $\frac{\partial u}{\partial y} =$ ————————.

(a) $x^{y-1}$ (b) $y^{x-1}$

(c) $y^{x^{y-1}}$ (d) $x\, y^{x-1}$

5. If $x = \sin^{-1}\left(\frac{x^2 + y^2}{x + y}\right)$, then $x \cdot \frac{\partial z}{\partial x} + y \cdot \frac{\partial z}{\partial y} =$ ————————.

(a) $\sin z$ (b) $\cos z$

(c) $\tan z$ (d) None

6. $\beta(m, n) =$ ————————.

(a) $\frac{\lceil m \cdot \lceil n}{\left\lceil\left(\frac{m}{n}\right)\right.}$ (b) $\frac{\lceil m \cdot \lceil n}{\lceil (m + n)}$

(c) $\frac{\lceil m \cdot \lceil n}{\left\lceil\left(\frac{n}{m}\right)\right.}$ (d) None

7. $\int_0^\infty e^{-x^2} \cdot dx =$ ————————.

(a) 0 (b) 1

(c) $\frac{\sqrt{\pi}}{2}$ (d) None

8. A square matrix $A$ is called orthogonal if ————————.

(a) $AA^{-1} = I$ (b) $AA^{-1} = A^T$

(c) $AA^T = I$ (d) None

9. The maximum rank of a $4 \times 5$ matrix is ————————.

(a) 5 (b) 9

(c) 4 (d) None

10. Rank of a unit matrix of order 4 is ————————.

(a) 2 (b) 3

(c) 4 (d) None

**Section B** $(5 \times 5 = 25)$

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

11. (a) Two places $A$ and $B$ on the earth have the following latitudes and longitudes $A(40°N, 18°E)$ and $B(0°N, 58°E)$. Find the angle of departure from $A$ to $B$ of the great circle route.

Or

(b) In $\Delta PXY, P = 53°20', X = 92°05', Y = 90°$. Find the other parts.

12. (a) Prove that the sum of the angles of a spherical $\Delta^{le}$ is greater than two and less than six, right angles.

Or

(b) If in the quadrantal $\Delta^{le} ABC$, $a = 90°$, $b = 78°14'$, and $c = 49°08'$. Find $A$ and $B$.

13. (a) If $x = 2\cos t - \cos 2t,\ y = 2\sin t - \sin 2t$. Find $\frac{d^2y}{dx^2}$ at $t = \frac{\pi}{2}$.

Or

(b) Given $z = 4x^2y^3 - 2x^3 + 7y^2$. Find $\frac{\partial^2 z}{\partial x^2}, \frac{\partial^2 z}{\partial y^2}, \frac{\partial^2 z}{\partial x\,\partial y}, \frac{\partial^2 z}{\partial y\,\partial x}$.

14. (a) Find $\int x^3 \cdot e^{-2x} \cdot dx$.

Or

(b) Evaluate $\int_0^{\frac{\pi}{2}} \sin^2 x \cdot \cos^3 x \cdot dx$.

15. (a) Find the rank of the matrix $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$.

Or

(b) Verify Cayley-Hamilton theorem and find the inverse of $A = \begin{bmatrix} 5 & 3 \\ 3 & 2 \end{bmatrix}$.

## Section C $(5 \times 8 = 40)$

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

16. (a) Find the equation of the smallest sphere which contains the circle $x^2 + y^2 + z^2 + 4x + 8y + 6z - 13 = 0$.

Or

(b) Derive the law of sines for angles.

17. (a) Derive Napiers analogies.

Or

(b) Derive the formula for half sides.

18. (a) If $y = e^{a \sin^{-1} x} \cdot P \cdot T \left(1 - x^2\right) y_{n+2} - (2n + 1) x y_{n+1} - \left(n^2 + a^2\right) y_n = 0$.

Hence find the value of $y_n$ when $x = 0$.

Or

(b) Determine whether

$F = \left(y^2 \cos x + z^3\right)\vec{i} + (2y \sin x - 4)\vec{j} + \left(3xz^2 + 2\right)\vec{k}$

is a conservative field? If so find the scalar potential $\phi$. Also compute the workdone in moving the particle from $(0, 1, -1)$ to $\left(\frac{\pi}{2}, -1, 2\right)$.

19. (a) Evaluate $\iint_R x^2 \cdot dxdy$ where $R$ is the region in the first quadrant bounded by the lines $x = y, y = 0$, $x = 8$ and the curve $xy = 16$.

Or

(b) By changing the order of integration of $\int_0^\infty \int_0^\infty e^{-xy} \sin px \cdot dxdy$ S.T $\int_0^\infty \frac{\sin px}{x} \cdot dx = \frac{\pi}{2}$.

20. (a) Reduce the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ to the diagonal form.

Or

(b) Find the eigen values and eigen vectors of $A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**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. The refrigerator works on the principle of _____
   (a) Evaporation (b) Condensation
   (c) Cooling (d) None

2. The apparent frequency will be _____ than the actual frequency in doppler effect.
   (a) Equal (b) Less
   (c) More (d) None

3. According to Hook's law, if stress is increased the ratio of stress to stain will be _____
   (a) Remain constant (b) Increase
   (c) Decrease (d) None

4. _____ is an universal logic gate.
   (a) OR (b) NOR
   (c) NAND (d) NAND and NOR

5. How many flip-flops are there in a flag register of 8085 microprocessor?

(a) 4 (b) 5

(c) 7 (d) 10

6. If the impinging bodies are perfectly plastic, the coefficient of restitution 'e' is _____

(a) 1 (b) 0

(c) ∞ (d) None

7. Modulus of electricity is defined as _____

(a) $E = \frac{\text{Strain}}{\text{Stress}}$

(b) $E = \frac{\text{Stress}}{\text{Strain}}$

(c) $E = \text{Stress} \times \text{Strain}$

(d) None

8. Audible range of intensity of sound by human ear is _____

(a) 100 Decibels (b) 110 Decibels

(c) 120 Decibels (d) None

9. The refractive index is _____

(a) $\mu = \frac{\sin i}{\sin r}$ (b) $\mu = \frac{\sin r}{\sin i}$

(c) $\mu = 0$ (d) None

10. Sextant is used to fine _____ of the building.

(a) Size (b) Angle

(c) Level (d) None

## Part B (5 × 5 = 25)

Answer **all** questions [Either (a) or (b)].

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

Or

(b) Explain the bending of EM waves by Ionosphere.

12. (a) Explain cantilever and bending of Beams.

Or

(b) Explain Photo – Electric cell.

13. (a) Explain transistor Wein bridge Oscillator.

Or

(b) Explain the types of logic gates and its working.

14. (a) Explain the derivation of Modulation Index.

Or

(b) Derive side bands in F.M.

15. (a) Explain in short satellite links and domestic satellites.

Or

(b) Draw and explain Architecture of 8085.

## Part C (5 × 8 = 40)

Answer **all** questions [Either (a) or (b)].

16. (a) Explain in detail conduction, convection and Radiation.

Or

(b) Explain Electromagnetic spectrum and describe its various parts.

17. (a) Explain Half-wave and Full-wave Bridge Rectifiers.

Or

(b) Explain the construction and symbol of Zener Diode and explain zener diode as a voltage regulator.

18. (a) Explain the working of phase shift oscillator.

Or

(b) Derive De Morgan's law and Boolean algebra.

19. (a) Explain the working and derivation of frequency modulation.

Or

(b) Explain demodulation of Diode detector circuit.

20. (a) Explain the elements of RADAR system.

Or

(b) Explain AM receivers and communication receivers.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Second Semester**

**Nautical Science**

**SHIP CONSTRUCTIONS**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** questions.

1. Collision bulkheads are

   (a) Thicker than other bulkheads

   (b) Thinner than other bulkheads

   (c) Weaker than other bulkheads

   (d) None of the above

2. Longitudinal frame runs

   (a) From side to side of ship

   (b) From forward to aft

   (c) From top to bottom

   (d) None of the above

3. Deep tanks are used for

(a) Stowage of fuel

(b) Storage of cargo

(c) Storage of Grains

(d) None of the above

4. Bilge keels are provided to prevent

(a) Rolling of ship

(b) Rolling of pitch

(c) Heaving of ship

(d) None of the above

5. Stern doors are provided in

(a) Ro-Ro ship

(b) Tanker ship

(c) Gas carrier ship

(d) None of the above

6. Spurling pipes is provided to facilitate the running of

(a) Mooring ropes

(b) Deck ropes

(c) Chain cable

(d) Propeller

7. The purpose of cable stoper is to prevent

(a) Running of Heaving lines

(b) Running of Mooring lines

(c) Running Anchor and chain cable

(d) None of the above

8. The Non return valves are fitted in

(a) Under water pipe lines of ship

(b) Ventilator pipes

(c) Trunkings

(d) None of the above

9. The Pitch of propeller is

(a) The distance a propeller would move in one revolution

(b) The length of propeller

(c) The length of shaft

(d) None of the above

10. The rudder is used for

(a) Maneuvering of ship

(b) Operate bilge keel

(c) Maintain watertightness of ship

(d) None of the above

## Part B (5 × 5 = 25)

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

11. (a) With an aid of neat sketch describe beam and beam knees.

Or

(b) Distinguish between Longitudinal and transverse frames.

12. (a) State the uses of Wing tanks Ballast tanks with neat diagram.

Or

(b) Describe the process of obtaining weather tightness in cargo spaces.

13. (a) Sketch and describe the construction of Hawse pipes.

Or

(b) Sketch and describe the construction of fair leads and Bits.

14. (a) What are Bilge piping systems? Explain with neat diagram.

Or

(b) State the purpose of Bow doors with neat sketches.

15. (a) Explain Boss, Rake, Skew Radius of propeller and Face.

Or

(b) Explain the purpose of Rudder carrier and pintles with neat diagram.

**Part C** $(5 \times 8 = 40)$

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

16. (a) With an aid of neat diagram explain the functions and construction of water tight bulkheads.

Or

(b) Explain the process of obtaining water tightness in cargo spaces General cargo ship with neat sketches.

17. (a) Discuss the Mooring arrangement of ship with neat diagram.

Or

(b) Draw the neat diagram of Admiralty pattern Anchor label the parts.

18. (a) Explain the Hold drainage system and related structural arrangement of tanker ship.

Or

(b) Draw the neat diagram of ventilation arrangements provided on Refer ships.

19. (a) Sketch and explain the special doors provided on Cargo vessels.

Or

(b) With a neat diagram explain the arrangements of stern tube to obtain watertightness.

20. (a) Draw the neat diagram of different types of Rudders used on board.

Or

(b) Discuss the welding process and its predominant use in ship construction.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Second Semester**

**Nautical Science**

**SHIP OPERATION TECHNOLOGY**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Section A** $(10 \times 1 = 10)$

Answer **all** questions.

1. Camber is provided for
   (a) Drainage of weather deck water
   (b) Drainage of tank water
   (c) Drainage of wink tank
   (d) None of the above

2. Poop deck is located at
   (a) Foremost part of ship
   (b) Stern part of ship
   (c) Midship art of ship
   (d) None of the above

3. Strongest ropes used in ship is
   (a) Kevlar rope (b) Manila rope
   (c) Nylon rope (d) Steel rope

4. The IMPA Code 211316 rope is
   (a) Signal halyard nylon 3/4”rope
   (b) Steel rope
   (c) Heaving rope
   (d) Natural rope
5. Bunting ropes are used for
   (a) Festive decorations
   (b) Bundling drums
   (c) Lashing deck cargoes
   (d) None of the above
6. The flag hoisted while Bunkering is
   (a) Flag Bravo (b) Flag Alpha
   (c) Flag Delta (d) Flag Zulu
7. The purpose of Bosun’s Chair is
   (a) Ensure safety of work performed at height
   (b) Ensure safety of work performed on water
   (c) Lift the cargoes
   (d) None of the above
8. The Gangway ladder cannot he inclined more than
   (a) 30°from the horizontal
   (b) 45°from the horizontal
   (c) 61° from the horizontal
   (d) 15°from the horizontal
9. The written permission is to be obtained for welding on board is
   (a) Hot work permit
   (b) Safet permit
   (c) Isolation permit
   (d) Bunkering permit

10. What is the minimum height for working aloft?

(a) 15 feet (b) 10 feet

(c) 23 feet (d) 25 feet

**Section B** $(5 \times 5 = 25)$

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

11. (a) Name any five Personal protective equipment.

Or

(b) Enlist ant five knots used on board ship.

12. (a) How will you obtain the flexibility of steel wire ropes.

Or

(b) Describe the grades of steel used for making wire ropes.

13. (a) Explain the different flags to be hoisted while entering foreign ports.

Or

(b) State the penalties for not using or wrongly using an Ensign.

14. (a) Describe the procedures for rescue from enclosed space entry.

Or

(b) List precaution to be observed while repairing Radar.

15. (a) Explain the conduct of safety committee meetings.

Or

(b) Discuss the entry procedure into enclosed space.

## Section C (5 × 8 = 40)

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

16. (a) Draw the profile view of General cargo ship and label any ten parts.

Or

(b) Explain the following :

(i) Boiler suits

(ii) Face masks

(iii) Chemical suits

(iv) Safety harness

(v) Ear muffles.

17. (a) Describe different types of fibre ropes and compare the strength and elasticity.

Or

(b) Explain the different types of Mooring ropes and their advantages and disadvantages.

18. (a) Explain the Halyard at the Dip, Close up and half-mast.

Or

(b) Explain the different flags use on board ship.

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

Or

(b) Explain the safety precautions while entering into Battery room and paint room.

20. (a) Explain the importance of personal health and hygiene on board ship.

Or

(b) Discuss the different types of permits.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Second Semester**

**Nautical Science**

**NAUTICAL MATHEMATICS – II**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** $(10 \times 1 = 10)$

Answer **all** questions.

1. The period of sine function is ————————.

(a) $\pi$ (b) $2\pi$

(c) $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$

2. The root mean square value of a function $f(x)$ in $(a,b)$ is ————————.

(a) $\sqrt{\int_a^b |f(x)|^2 \, dx}$ (b) $\sqrt{\int_a^b |f(x)|^3 \, dx}$

(c) $\sqrt{\frac{\int_a^b |f(x)|^2 \, dx}{b-a}}$ (d) $\sqrt{\frac{\int_a^b |f(x)|^3 \, dx}{b-a}}$

3. $L[e^{at}]$ = ————————.

(a) $\frac{1}{s-a}$ (b) $\frac{1}{s+a}$

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

4. $L^{-1}\left[\frac{s}{s^2+a^2}\right]$ = ————————.

(a) $\sin at$ (b) $\cos at$

(c) $\sinh at$ (d) $\cosh at$

5. Range = ————————.

(a) Maximum value

(b) Minimum value

(c) Maximum value – Minimum value

(d) Minimum value – Max. value

6. The mode for the data : 1, 1, 3, 5, 7, 7, 7, 10 is

(a) 1 (b) 7

(c) 10 (d) 9

7. $\Delta$ = ————————.

(a) $E-1$

(b) $E+1$

(c) $E$

(d) $E-2$

8. The relation between the operator $E, \Delta$ and $\nabla$ is ———.

(a) $\Delta = E\,\nabla$

(b) $\Delta = E\,\Delta$

(c) $\nabla = E\,\Delta$

(d) $\nabla = E\,\nabla$

9. The order of error is Simpson's $\frac{1}{3}$ rule is ————————.

(a) $h^3$ (b) $h$

(c) $h^2$ (d) $h^4$

10. The error of Trapezoid rule is of order ————————.

(a) $h^3$ (b) $h$

(c) $h^2$ (d) $h^4$

## Part B $(5 \times 5 = 25)$

Answer **all** questions.

11. (a) Find the Fourier sine series for the function $f(x) = \pi - x$ in $(0, \pi)$.

Or

(b) Obtain the Fourier co-efficient $a_0$ for the function $f(x) = x^2$ in $-\pi < x < \pi$.

12. (a) Find $L[\cos ax]$.

Or

(b) Find the inverse Laplace transform of $\frac{1}{(s+3)^2 + 25}$.

13. (a) Find the standard deviation for the following data.

| $x$ | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|---|---|---|---|---|---|---|---|---|---|---|
| $f$ | 1 | 5 | 11 | 15 | 12 | 7 | 3 | 2 | 0 | 1 |

Or

(b) Find the correlation coefficient for the following data.

| $x$ | 10 | 12 | 18 | 24 | 23 | 27 |
|---|---|---|---|---|---|---|
| $y$ | 13 | 18 | 12 | 25 | 30 | 10 |

14. (a) Form the difference table for the following data.

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| $y$ | 1 | 5 | 19 | 55 | 125 | 241 |

Or

(b) Prove that $\Delta\nabla = \Delta - \nabla = \delta^2$.

15. (a) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule with $h = 0.2$

Or

(b) We Lagrange's interpolation formula to fit a polynomial to the data.

| $x$ | 0 | 1 | 3 | 4 |
|---|---|---|---|---|
| $y$ | -12 | 0 | 6 | 12 |

## Part C

$(5 \times 8 = 40)$

Answer **all** questions.

16. (a) If $f(x)=\begin{cases}-\pi/4 \text{ if } -\pi < x < 0 \\ \pi/4 \text{ if } 0 < x < \pi\end{cases}$, expand $f(x)$ as a Fourier series in $(-\pi, \pi)$,

Or

(b) Find the half range sine series for the function $f(x)=x(\pi-x)$ in $(0, \pi)$

17. (a) Find the Laplace transform of $t^4+t^3+\cos 2t \cos t$ .

Or

(b) Find $L^{-1}\left[\frac{1}{s(s+1)(s+2)}\right]$.

18. (a) Find standard deviation and quartile deviation for the data:

| *Class Intervals* | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
|---|---|---|---|---|---|---|
| *f* | 37 | 50 | 42 | 21 | 11 | 3 |

Or

(b) Find the regression line for the following data :

| $x$ | 26 | 29 | 31 | 33 | 35 | 34 | 38 | 39 | 41 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|
| $f$ | 22 | 26 | 27 | 31 | 28 | 19 | 29 | 36 | 35 | 46 |

19. (a) Find a root of the equation $x^3 - 3x - 5 = 0$ by the method of false position.

Or

(b) Find a real root of $x^3 - 3x + 1 = 0$ in (1,2) correct to three places of decimals by bisection method.

20. (a) Evaluate $\int_0^{\pi/2} \sin x \, dx$ by simpson's $\frac{1}{3}$ rule dividing the range into six equal parts.

Or

(b) A function $y = f(x)$ is given by the following table. Find $f(0.2)$ by a suitable formula.

| $x$ | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| $f$ | 176 | 185 | 194 | 203 | 212 | 220 | 229 |

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Second Semester**

**Nautical Science**

**NAUTICAL PHYSICS AND ELECTRICITY – I**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** $(10 \times 1 = 10)$

Answer **all** questions.

1. The unit of magnetic flux is _____.

   (a) Weber

   (b) Watt

   (c) Newton meter square

   (d) Ohm

2. The magnitude of emf induced in a closed circuit is _____ to the rate of change of magnetic flux linked with the circuit.

   (a) directly proportional

   (b) equal

   (c) inversely proportional

   (d) greater

3. The net effective opposition offered by the combination of resistor, inductor and capacitor is known as _____ of the circuit.

(a) self induction (b) mutual induction

(c) induction (d) impedance

4. Q factor = _____.

(a) $\frac{\text{Voltage across L or C}}{\text{Applied voltage}}$

(b) $\frac{\text{Applied Voltage}}{\text{Voltage across L or C}}$

(c) $\frac{\text{Applied Current}}{\text{Current across L or C}}$

(d) $\frac{\text{Current across L or C}}{\text{Applied Current}}$

5. The unit of power is _____.

(a) Weber (b) Ohm

(c) Watt (d) Tesla meter square

6. The algebraic sum of currents meeting at ant junction in a circuit is _____.

(a) zero (b) unity

(c) greater (d) lower

7. The principle used in AC Generator is _____.

(a) Magnetic induction

(b) Electro-magnetic induction

(c) Magnetic power

(d) Electro-magnetic power

8. Fuse has _____ resistance.

(a) low (b) high

(c) no (d) either (a) or (c)

9. Transducer is an electronic device that converts _____ from one form to another.

(a) power (b) work

(c) force (d) energy

10. Which of the following is an application of venture tube?

(a) Spray can (b) Space rockets

(c) Car carburetors (d) All the above

**Part B** $(5 \times 5 = 25)$

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

11. (a) Describe Faraday – Lenz's law.

Or

(b) Explain coupling coefficients.

12. (a) Describe AC and DC voltage.

Or

(b) Explain Impedance and earthling insulators.

13. (a) Explain the applications of Wheatstone Bridge.

Or

(b) Explain Q of coil.

14. (a) Define voltage an current source.

Or

(b) State and prove Kirchoff's 1st Law.

15. (a) Explain venture tube.

Or

(b) Explain the applications of fuses.

**Part C** $(5 \times 8 = 40)$

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 capacitors in series and parallel.

Or

(b) Explain series and parallel RLC circuits.

18. (a) Describe Bridge circuits.

Or

(b) Explain Wheatstone bridge.

19. (a) Prove Kirchoff's Law.

Or

(b) Explain the classification of Network elements.

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

Or

(b) Explain the heating effect of current and heaters.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Second Semester**

**Nautical Science**

**FUNDAMENTALS OF COMPUTER SCIENCE**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** questions.

1. ASCII means _____.

   (a) American Standard Code for Information Interchange

   (b) American Scheme Code for Information Interchange

   (c) American Standard code for Interchange Information

   (d) American Scheme Code for Interchange Information

2. The 2's complement of 110101 is _____.

   (a) 001000 (b) 000100

   (c) 001011 (d) 110100

3. Which of the following is an example of secondary memories in computer?

   (a) Hard Drive (b) SSD

   (c) Flash (d) All the above

4. _____ translates the entire source code into machine code before execution

(a) Interpreter (b) Compiler

(c) Sourcer (d) Scripter

5. Digital cash allows an individual to make online transaction using _____.

(a) Digital currency (b) Debit cards

(c) Credit cards (d) Either (b) or (c)

6. Which of the following is a popular e-commerce payment method?

(a) Credit card (b) Debit card

(c) Digital wallets (d) All the above

7. To add values in Excel _____ function is used.

(a) SUM (b) MIN

(c) AVERAGE (d) DIFFERENCE

8. Which chart is used to emphasize the magnitude of change over time?

(a) Bar chart (b) Bubble chart

(c) Area chart (d) Scatter chart

9. Pick out the data file types in Python.

(a) Text file (b) Binary file

(c) Script file (d) Both (a) or (b)

10. _____ are used to test whether a value or variable is found in a sequence.

(a) Data (b) Header

(c) Functions (d) Operators

## Part B (5 × 5 = 25)

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

11. (a) Convert $1101101110_2$ to decimal number system.

Or

(b) Explain EBCDIC code.

12. (a) Write about Real and Virtual memory.

Or

(b) Explain Machine language and Assembly language.

13. (a) Explain the concepts of Electronic communication.

Or

(b) What are the concerns for E-Commerce growth?

14. (a) How will you insert pictures in MS-Word?

Or

(b) How will you animate graphics in power point presentation?

15. (a) What are python data types?

Or

(b) Explain about for loop.

## Part C (5 × 8 = 40)

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

16. (a) Explain number systems.

Or

(b) Explain binary codes.

17. (a) Explain different types of memory.

Or

(b) Explain different types of languages.

18. (a) Explain in detail about E-Commerce.

Or

(b) Explain cyber cash.

19. (a) How will you use conditional formatting an data in cells.

Or

(b) How to create a slide, add new slide, create slide transitions explain.

20. (a) Explain conditional statements.

Or

(b) Explain different types of function methods in python.

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| 11629 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Second Semester**

**Nautical Science**

**METEOROLOGY AND ENVIRONMENTAL STUDIES**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Section A** $(10 \times 1 = 10)$

Answer **all** questions.

1. The product of forest is

   (a) Steel (b) Brass

   (c) Rubber (d) None of the above

2. Natural resources are

   (a) Forest resource

   (b) Water resource

   (c) Food resource

   (d) All the above

3. Which one is not the hot spot of Biodiversity Fraying

   (a) Western Ghats

   (b) Indo-Burma

   (c) Madagascar

   (d) Madras

4. A biodiversity cool spot means

(a) A region with a limited number of living things

(b) A region with a large number of living things

(c) A region with more human beings

(d) None of the above

5. Nuclear hazards means

(a) Release of radiation

(b) Release of Sun rays

(c) Release of wind energy

(d) Release of Tidal energy

6. Acid rain is caused by

(a) Chemical reaction

(b) Mechanical reaction

(c) Electrochemical reaction

(d) All the above

7. Which one is not the Greenhouse gases

(a) Methane (b) Oxygen

(c) $CO_2$ (d) $N_2O$

8. What affects Saturation point of solution

(a) The concentration of the solute

(b) The temperature

(c) Surface area of solute

(d) None of the above

9. Composition of earth's atmosphere

(a) Dry air (b) water

(c) Vapour (d) All the above

10. Wind is caused by uneven heating on earth's surface

(a) True (b) False

(c) May be (d) Not sure

**Section B** $(5 \times 5 = 25)$

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

11. (a) Describe the Biotic resources.

Or

(b) Explain forest resources in detail.

12. (a) State the non-renewable energy sources.

Or

(b) Describe the endangered and endemic species of India.

13. (a) How does the Acid rain form? Explain in detail.

Or

(b) List activities initiated by the Government to enhance Women and Child welfare.

14. (a) Describe the effects of greenhouse gases.

Or

(b) Why does the surface pressure rise if air is added to the column above the surface.

15. (a) Enumerate the Greenhouse gases and their effect.

Or

(b) Express the Beaufort scale of wind force.

## Section C (5 × 8 = 40)

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

16. (a) Explain the renewable resources of India in detail.

Or

(b) Explain the problems associated with natural resources.

17. (a) Describe urban problems related to energy.

Or

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

18. (a) Explain the disaster management organization in India.

Or

(b) Explain the Family welfare programs adopted in India.

19. (a) Discuss the composition of earth's atmosphere.

Or

(b) Explain the radiation budget of the earth.

20. (a) Explain the method of estimating the strength of wind.

Or

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

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| 11634 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Third Semester**

**Nautical Science**

**SHIP STABILITY – I**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **ALL** questions.

1. When a body is floating in a liquid, the weight of liquid displaced equals to _____.

   (a) Height of the body (b) Weight of the body

   (c) Width of the body (d) None of above

2. _____ is the number of tonnes required to cause the ship to sink or rise by one centimeter.

   (a) Tonnes per centimeter

   (b) Tonnes per millimeter

   (c) Centre of buoyancy

   (d) None of above

3. A homogenous rectangular log 6m×1.5m×1m has RD 0.7. Find its draft in FW.

(a) 0.5 M (b) 0.6 M

(c) 0.7 M (d) 0.8 M

4. _____ is the volume of the enclosed spaces above the waterline.

(a) Centre on Buoyancy

(b) Reserve Buoyancy

(c) Centre of gravity

(d) None of above

5. _____ is the increase in draft when a ship goes from saltwater to dock water.

(a) DWA (b) SWA

(c) Heel (d) None of above

6. List is the _____ caused by unequal distribution of weight on either side of the center line of the ship.

(a) Transverse inclination

(b) Transverse matacentre

(c) Metacentric height

(d) None of above

7. When a vessel is heeled, the external force of buoyancy acting vertically upwards through the new position of CoB, cuts the centre line of the ship at a point called the _____.

(a) Transverse inclination

(b) Transverse metacentre

(c) Metacentric height

(d) None of above

8. _____ is the vertical distance b/w the COQ and the metacentre.

(a) Transverse inclination

(b) Transverse metacentre

(c) Metacentric height

(d) None of above

9. _____is the transverse inclination of the ship.

(a) Heel (b) Slings

(c) Thrust (d) Trim

10. _____ (or) coefficient of fineness of the water plane area.

(a) Water plane coefficient

(b) Block coefficient

(c) Water coefficient

(d) None of above

## Part B (5 × 5 = 25)

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

11. (a) Sketch and define water plane coefficient.

Or

(b) Show the relationship between Cp, Cb and Cm.

12. (a) Define centre of gravity of ship and the factors affecting it.

Or

(b) Explain how freeboard is related to reserve buoyancy.

13. (a) Explain with the aid of sketch about righting moment.

Or

(b) Explain with the aid of sketch transverse metacentre.

14. (a) Sketch the mid ship transverse section of a listed ship.

Or

(b) Show that $\tan\theta = GG1/G\,M$.

15. (a) M.V. Hindship is floating at a draft of F 5.65 m, A7.45 m. Calculate

(i) Her hydrostatic draft

(ii) Her displacement.

Or

(b) M.V. Hind ship at a displacement of 18420 tonnes has a free surface moment of 1972mt. Calculate the free surface correction.

**Part C** $(5 \times 8 = 40)$

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

16. (a) Show mathematically,

(i) Dead weight = Load Displacement – Light Displacement,

(ii) Dead weight Available = Load Displacement - Present.

Or

(b) Sketch and define TPC. Show that TPC = Density × A/100

17. (a) Calculate movement of COG when only one operation is carried out using GGI formula.

Or

(b) A box shaped vessel L = 60 m, B = 0 m, Draft = 5 m on even keel density = 1.025. Find KB and BM.

18. (a) With the aid of sketches show a vessel in each of the following.

(i) Stable equilibrium

(ii) Unstable Equilibrium

Or

(b) Sketch the mid ship transverse section of a box shaped vessel to show neutral equilibrium.

19. (a) State formula for calculating Free Surface Correction (FSC) due to single slack Tank.

Or

(b) Sketch the mid ship transverse section of a heeled ship.

20. (a) M.V. Hindship floating at a displacement of 8420 tonnes has a free surface moment of 1542 mt. Find her GM (fluid) if KG = 7.651m.

Or

(b) M.V. Hindship floating at a displacement of 14240 tonnes had a FSC of 0.087m. Find the FSC after having discharge 3210 tonnes of cargo, assuming the tank soundings remained unchanged

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| 11635 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Third Semester**

**Nautical Science**

**VOYAGE PLANNING AND COLLISION PREVENTION**
**(BA CHART.813)**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Section A** (10 × 1 = 10)

Answer **all** questions.

1. Which chart is intended for navigation in small water ways?

   (a) Ocean chart (b) Plan chart

   (c) Harbour chart (d) Routeing chart

2. Gnomonic projection displays all _____ as straight lines to show route between end points.

   (a) Great circle (b) Small circle

   (c) Meridian (d) Zenith

3. Sector light can be used in daylight with upto _____ (Km) visibility.

   (a) 20 km (b) 18km

   (c) 18.5km (d) 20.5km

4. _____ is the water level surface serving as origin of depths displayed in a nautical chart for reporting.

(a) Ordnance datum (b) Chart datum

(c) Vertical datum (d) Horizontal datum

5. ADMIRALITY _____ enables easy maintenance and cross indexing of correction made to ADMIRALITY charts.

(a) NP133A (b) NP133B

(c) NP130A (d) NP130B

6. ADMIRALITY NPB is published annualy in _____

(a) March (b) May

(c) July (d) January

7. Compass north is the direction that a compass needle points to align with the _____

(a) Earth's Magnetic field

(b) Equator

(c) North pole

(d) South pole

8. _____ is the amount by which the ships compass is affected by the characteristics of the vessel.

(a) Declination (b) Deviation

(c) Reflection (d) Refraction

9. _____ is a lane separating traffic lanes in which ships are traveling in opposite directions.

(a) Traffic lane (b) Separation line

(c) Separation zone (d) Inshore Traffic zone

10. Narrow channel is _____ miles wide.

(a) 2 (b) 3

(c) 4 (d) 5

## Section B (5 × 5 = 25)

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

11. (a) Explain ocean charts.

Or

(b) Explain routing guides.

12. (a) Describe geographical range of a light.

Or

(b) How will you identify radar responsive targets.

13. (a) Explain cummulative Notices to Mariness.

Or

(b) How will you record updates in NP133A?

14. (a) How will you calculate variation from the chart?

Or

(b) Explain the use of transit bearings to determine compass error.

15. (a) Define (i) Separation line (ii) Traffic lane (iii) Inshore Traffic Zone.

Or

(b) Explain the terms 'Give way' and 'stand' on' vessel.

## Section C (5 × 8 = 40)

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

16. (a) Explain the following :

(i) Large scale coastal and Harbour charts.

(ii) Plan charts.

Or

(b) Describe Gnomonic chart and its advantages.

17. (a) Explain leading light.

Or

(b) How will you identify the chart symbols for rock, wreck, obstruction, tide & current in INT 5011.

18. (a) Explain the Annual Summary of Notices to Mariners.

Or

(b) Describe the process of checking newly received charts.

19. (a) How do you use HORIZONTAL SEXANT ANGE for fixing a v/l's position.

Or

(b) How will you determine the Compass course and distance between any two points on the chart.

20. (a) Explain the actions to avoid collission in Rules.

Or

(b) Explain Rule 19.

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| 11636 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Third Semester**

**Nautical Science**

**CARGO OPERATION - I**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** questions.

1. _____ enables to operate a long lasting and more environmentally friendly vessel.

   (a) Slings (b) Structural Integrity

   (c) Dunnage (d) None of the above

2. Reefer Cargo is a type of _____

   (a) General Cargo (b) Vessel

   (c) Ullage (d) None of the above

3. A _____ refers to its ability to prevent water from entering a ship's cargo holds below deck.

   (a) Hatch cover

   (b) Hatch cover Water tightness

   (c) Slings

   (d) None of the above

4. _____ focuses on the efficiency of space utilization within the cargo hold of a ship.

(a) Relative density (b) Density

(c) Load density (d) None of the above

5. _____ refers to measuring the depth of water, usually with a sounding line or echosounding device.

(a) Sounding (b) Loading

(c) Ballasting (d) None of the above

6. The Officer on Cargo watch plays a crucial role in overseeing _____ and _____operations.

(a) Ballasting and Sounding

(b) Sounding and Deballasting

(c) Ballasting and Deballasting

(d) None of the above

7. Polypropollene is a type of _____

(a) Slings (b) Tackle

(c) Rope (d) None of Above

8. _____ are essential tools used for lifting, lowering and securing cargo during loading and unloading operations.

(a) Tackle (b) Rope

(c) Slings (d) None of Above

9. There are _____ types of ships.

(a) 6 (b) 7

(c) 8 (d) 9

10. The securing of cargo are _____, _____, front wall and shoring.

(a) Dunnage, Wedges (b) Dunnage, Slings

(c) Slings, Wedges (d) None of Above

## Part B (5 × 5 = 25)

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

11. (a) Explain the control and prevention of hazards of fire.

Or

(b) Explain (i) Method of Loading, (ii) Discharging by Grab.

12. (a) Explain why the load on cargo gear should never exceed its safe working load.

Or

(b) Derive the relationship between Effort and Load.

13. (a) Explain Dunnage and its uses to increase friction and prevent damage from sweat.

Or

(b) What are the operational checks to be done on ship's cargo gear before handing over to stevedores including checks on limit cutouts?

14. (a) Explain the effect of loadlines on Cargo loadables.

Or

(b) Explain the importance of clear drainage channels and drain holes.

15. (a) Discuss about the inspections to be done prior work of cargo gear.

Or

(b) What are the effective communications to be done during loading and discharging.

## Part C (5 × 8 = 40)

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

16. (a) Explain (i) Bale and Grain Capacity (ii) Load density (iii) Cargo density (iv) village and soundings.

Or

(b) Explain in detail the types of General Cargo ships.

17. (a) Explain the parts of a tackle and write its advantages and disadvantages.

Or

(b) Explain the different types of slings used for lifting cargo.

18. (a) Explain the list contents of lashing code and cargo securing manual.

Or

(b) Explain the working of cranes and the different testing of cranes.

19. (a) Calculate the cargo quantities formula i)Height, ii) Bale or grain capacity and write the effect of loadlines on Cargo loadables.

Or

(b) Explain the types of Hatches and explain the Handling and Maintenance of Hatch-Covers.

20. (a) Explain the dock labour regulations and the personal protection and awareness of moving parts of machinery.

Or

(b) Explain the precautions to be taken when using (i) forklifts (ii) bulldozers (iii) grabs, (iv) heavy gear.

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| 11637 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Third Semester**

**Nautical Science**

**NAVIGATION WATCH KEEPING AND BRIDGE EQUIPMENT - I**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** questions.

1. ———— is generated by convection currents of molt iron and nickel in the earth's core.

   (a) Magnetic compass

   (b) Magnetism of Earth

   (c) Sextant

   (d) None of Above

2. There are ——— intercardinal points in compass points.

   (a) 4 (b) 5

   (c) 6 (d) 7

3. Principle of sextant is based on the fact that twice the angle between the mirrors must equal to the angle between ————.

(a) Initial and final direction of a ray of light

(b) Initial direction of a ray of light

(c) Final direction of a ray of light

(d) None of Above

4. ———— is a fixed point on the globe.

(a) True South

(b) True North

(c) Magnetic North

(d) None of Above

5. The deviation changes as a ships magnetic properties changes is a practical limitations of ————.

(a) Magnetic Compass

(b) Compass

(c) Rudder

(d) None of Above

6. ———— uses sensors to detect potential bazard on sea used during the failure of the ships main steering system.

(a) Echo sounder

(b) sextant

(c) Emergency steering system

(d) None of Above

7. ———— is used to read the structure of the sea floor to find the underwater objects.

(a) sextant

(b) Echosounder

(c) Magnet

(d) None of above

8. An ———— can lead to severe electrical problems

(a) Incorrect phase sequence

(b) Phase sequence

(c) Echo sounder

(d) None of Above

9. ———— is the angle between any two points

(a) variation

(b) bearing

(c) deviation

(d) None of above

10. ———— is a hydraulic device by which the movement of the wheel on a ships bridge operates steering gear to stern.

(a) Telemotor

(b) sextant

(c) Echo sounder

(d) none of above

## Part B (5 × 5 = 25)

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

11. (a) Describe the duties of the officer of the watch while at anchor.

Or

(b) List out the entries which should be made in the logbook.

12. (a) State and explain the importance of beam bearings.

Or

(b) Write the uses of GPS.

13. (a) Explain the parts of a sextant.

Or

(b) State the importance of checking of compass error regularly.

14. (a) State the difference between ground reference speed and water reference speed.

Or

(b) Explain the need for Regular checking of the automatic pilot to ensure that is the steering the correct course.

15. (a) Describe the physical factors which affect the velocity sound in seawater.

Or

(b) Differentiate between Range and Phase.

**Part C** $(5 \times 8 = 40)$

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

16. (a) Describe the recommendations on operational guidance for officers in charge of a navigational water as of the STCW Code.

Or

(b) Explain the circumstances in which the officer on watch (OOW) should call the master.

17. (a) Write the guidelines for recording of events related to Navigation Res A916.

Or

(b) Explain a Turning circle in relation to length of vessels and length of cable used.

18. (a) Sketch the layout of the Bridge with its Navigational Equipment.

Or

(b) Describe the binnacle and the arrangements of correcting devices provided.

19. (a) Explain the Principle, Errors and limitations of Doppler Speed log.

Or

(b) Sketch and explain with the help of diagram how is a ship's speed transmitted to remote displays.

20. (a) Describe the uses, care and Precautions while operating wipers and clean view screen. (CVS).

Or

(b) Explain with a block diagram the main components of an Echo-Sounder.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Third Semester**

**Nautical Science**

**MARINE ENGINEERING, AUTOMATION AND CONTROL SYSTEM – I**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** Questions.

1. The basic raw material for _____ is either the hot metal from the blast furnace, steel scrap or a mixture of both.

   (a) Iron manufacture

   (b) Steel manufacture

   (c) Iron core

   (d) None of Above

2. The process of affecting and enhancing the properties of metals by controlling the heating and cooling rates is _____

   (a) Heat treatment of metals

   (b) Heat treatment of iron

   (c) Heat treatment of steel

   (d) None of Above

3. Reciprocating compressor is a type of _____.
   (a) Rudder
   (b) Compressor
   (c) Compressor on board
   (d) None of Above

4. _____ should be raised to 70°C before opening for inspection to kill of any bacteria colonies.
   (a) Boiler (b) Chlorinators
   (c) Compressor (d) None of Above

5. A _____ is used on a ship to maintain constant water pressure to all parts of a ship.
   (a) Hydrophore system
   (b) Hydraulic system
   (c) Chlorinators
   (d) None of Above

6. The steam received from _____ is not very dry.
   (a) Fire tube Boiler (b) Water Tube Boiler
   (c) Rudder (d) None of Above

7. The compressor is protected by _____ safety switches.
   (a) 2 (b) 3
   (c) 4 (d) 5

8. All the systems on board ship require proper operational and compatible pump and _____.
   (a) Pumping system (b) Fire system
   (c) Electric system (d) None of Above

9. A _____ is a rudder in which the axis of rotation of the rudder is behind its front edge.
   (a) Unbalanced Rudder
   (b) Balanced Rudder
   (c) Tackle
   (d) None of Above

10. There are _____ gas laws.

(a) 3 (b) 4

(c) 5 (d) 6

**Part B** (5 × 5 = 25)

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

11. (a) Explain failure of materials under Tension and Compression.

Or

(b) What are the different types of steel and their uses?

12. (a) Name the services supplied from emergency generator.

Or

(b) Name the various circuit breakers and its applications.

13. (a) Explain the classification of ship as per Propulsion plant.

Or

(b) Explain the requirements of production of FW on board.

14. (a) Explain the use of boiler on board.

Or

(b) Write the safety precautions while working with compressed air.

15. (a) Describe a basic refrigeration compression cycle.

Or

(b) Explain the requirements of main and emergency fire pump.

## Part C (5 × 8 = 40)

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

16. (a) Explain the terms-Hardness, Ductility, Malleability and Melting Point.

Or

(b) Explain in detail about ceramics and the uses of ceramics.

17. (a) Explain with diagram the procedure for starting emergency generator manually.

Or

(b) Explain the working principle of step Down Transformer with diagram.

18. (a) List the function of various machineries/equipments in the Engine Room.

Or

(b) Describe a sanitary water Hydrophore system.

19. (a) Describe with diagram the construction of water tube Boiler.

Or

(b) Explain with diagram Waste heat Recovery Boiler.

20. (a) Explain the working principles of different pumps.

Or

(b) Describe Ram type and Rotary vane steering gear.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fourth Semester**

**Nautical Science**

**NAVIGATION - III**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** $(10 \times 1 = 10)$

Answer **all** questions.

1. The interval between two successive meridian passage of first point of Aries over the same meridian is ————.

   (a) Solar day (b) Mean Solar day

   (c) Sidereal day (d) Apparent Solar day

2. ———— is the westerly hour angle of the mean sun measured from the observers inferior meridian.

   (a) LHA (b) LAT

   (c) SHA (d) ET

3. ———— is the arc of the observers rational horizon on the angle at his zenith contained between the observers celestial meridian and the vertical circle through that body.

   (a) Azimuth (b) Altitude

   (c) Meridian (d) Zenith

4. True altitude of a body is the arc of the ———— through the body contained between the rational horizon and the centre of the body.

(a) Great (b) Horizontal

(c) Vertical (d) Either (b) or (c)

5. PZX is formed by the intersection of ———— great circles.

(a) 4 (b) 5

(c) 6 (d) 3

6. Pick out the sextant corrections that are applicable for Polaris

(a) 1E (b) $a_0$

(c) $a_1$ (d) All the above

7. When the sun is below the horizon, the light received from the sun is known as ————.

(a) Twilight (b) Solar light

(c) Sidereal light (d) Mean light

8. For continuous night the observers latitude are ————

(a) lat + dec > /= 90 ° (b) lat + dec > /= 45 °

(c) lat – dec > /= 90 ° (d) lat – dec > /= 45 °

9. In quadrant triangle one side is ————.

(a) 45 ° (b) 90 °

(c) 80 ° (d) 30 °

10. Zenith distance = ————.

(a) 90 °– Azimuth (b) 90 °– Altitude

(c) 45 °– Azimuth (d) 45 °– Altitude

## 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) Demonstrate the use of time signal.

12. (a) Prove that sin amp = sin decl. sec. lat.

Or

(b) Obtain the error of magnetic compass.

13. (a) Explain Navigational stars.

Or

(b) Explain the corrections $1^{o}$, $+a_0$ from polestar tables.

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

Or

(b) Define co-latitude, polar distance and zenith distance.

15. (a) During same night, a star bore south with true altitude $28^{o}$ 34' and again with a true altitude $76^{o}$ 46'. Calculate star's declination and the latitude of the observer.

Or

(b) Describe Nautical and Astronomical.

## Part C (5 × 8 = 40)

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

16. (a) Explain the reasons for the suns irregular rate of change of SHA.

Or

(b) Determine the ET from the almanac and its sign of application.

17. (a) How will you determine the observed altitude of the sun when the true altitude is zero?

Or

(b) Obtain the error of gyrocompass by comparing the compass bearing of the body with the true azimuth of the body obtained at the time of observation.

18. (a) How will you find true azimuth of the Polaris from tables and the direction of the Position line?

Or

(b) Establish the relationship between the altitude of the Polaris and the Observer's latitude.

19. (a) Determine the relationship between true azimuth of a body with position line.

Or

(b) How will you solve the PZX triangle to find the calculated zenith distance of the body when it is out of meridian?

20. (a) Define twilight. Explain clearly the causes of twilight and the reason why twilight lasts longer in higher latitudes.

Or

(b) What are the necessary conditions for a body to be circumpolar?

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fourth Semester**

**Nautical Science**

**SHIP STABILITY - II**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** questions.

1. The difference b/w the drafts fwd and aft, expressed in metres or in centimetres is called ————————.

   (a) Slings

   (b) Heel

   (c) Trim

   (d) None of above

2. A ———————— is a graph wherein the righting lever is plotted against the angle of heel.

   (a) Curve of statical stability

   (b) Statical curve

   (c) stability curve

   (d) None of above

3. When a vessel is heeled if she tends to come back to her original condition, she is said to be in ————————.

(a) Neutral Equilibrium

(b) Unstable Equilibrium

(c) Stable Equilibrium

(d) None of above

4. When a vessel is heeled the force of buoyancy becomes separated from the force of gravity by a horizontal distance called ————————.

(a) Righting lever

(b) Thrust

(c) Trim

(d) None of above

5. On a ship of W5000t , GM 0.8m, 40t of Cargo is shifted transversely by 10m. Find the list.

(a) 4°43′ (b) 5°43′

(c) 6°43′ (d) 7°43′

6. FWA = ————————

(a) $\frac{W}{30} \times TPC$

(b) $\frac{W}{40} \times TPC$

(c) $\frac{W}{TPC} \times 30$

(d) $\frac{W}{TPC} \times 40$

7. Density = ————————

(a) $\frac{\text{Mass}}{\text{Volume}}$

(b) Mass × Volume

(c) $\frac{\text{Volume}}{\text{Mass}}$

(d) None of Above

8. ———————— is the total pressure exerted on a given surface.

(a) Thrust

(b) Density

(c) Heel

(d) None of Above

9. A tank has a volume of $400m^3$. Find how may tonnes of SW (density 1.025 $tm^{-3}$) it can hold?

(a) 400 tons

(b) 410 tons

(c) 420 tons

(d) None of above

10. If the draft fwd is greater, the ship is said to be ————————

(a) trimmed

(b) trimmed by the head

(c) trimmed by the deck

(d) None of above

## Part B (5 × 5 = 25)

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

11. (a) Explain the changes in the position of COG and COB.

Or

(b) Explain the Bodily sinkage or rise due to change in density.

12. (a) Explain Angle of Vanishing Stability.

Or

(b) Explain how to use cross curves of stability and compute value of GZ for given displacement.

13. (a) Explain Simpson's First Rule.

Or

(b) Explain the Hazards associated with respect to ship stability during carriage of grain in bulk.

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

Or

(b) Derive the formula for calculating MCTC.

15. (a) M.V Hindship floating at a displacement of 13750 tonnes KG 6.2m, FSC 0.12m, is listed $1\frac{1^{\circ}}{2}$ to starb. Find the amount of Cargo to be loaded in No.4 TD 6m off the centre line to bring the vessel upright.

Or

(b) Find the Moment of statical stability of M.V. Hindship at an angle of heel of 7", when displacing 16133t, KG 7.51 m, FSC .0.085 m.

## Part C (5 × 8 = 40)

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

16. (a) Calculate the changes of drafts and Trim due to loading, discharging and shifting weights.

Or

(b) Explain the theory of trim and change of trim due to change of velocity for a box shaped vessel.

17. (a) Sketch showing how the GZ curve for vessel with a zero GM is affected by a rise in the vessels KG.

Or

(b) A vessel loads a packed timber cargo on deck such that there is an increase in the vessel's KG and an effective increase in freeboard. Using a sketch, show the effect of loading this Cargo on the Vessels's GZ curve.

18. (a) Use Atwood's formula to Obtain GZ value at moderate and large angles of heel.

Or

(b) Sketch and describe the stability criteria for grain cargo as per part B of SOLAS 74.

19. (a) Explain in detail with diagram, how a vessel takes to angle of loll.

Or

(b) Derive the formula for calculating TPC.

20. (a) M.V. Hindship at a hydrostatic draft of 5.76m in FW is listed 0°50′ to port KG 7.68m, FSC 0.09m. A parcel of Cargo weighing 80t is shifted from 1m to port of CL to 4.5m off the CL to port. Calculate the final list.

Or

(b) M. V. Hindship floating at a draft of F 5.65m and A 7.45m, LCG 70.47m, ford of AF, loads 500 tonnes of Cargo, 100.5m ford of AP. Calculate (i) her final displacement, (ii) final hydrostatic draft and (iii) final drafts F & A.

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fourth Semester**

**Nautical Science**

**CARGO OPERATION - II**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** questions.

1. ———— will break away when struck with a fist or when light pressure is applied with a knife blade.

   (a) Slings (b) Loose scales

   (c) Scales (d) None of Above

2. ———— is the durable padding material used to protect goods during shipping.

   (a) Dunnage (b) Cargo

   (c) Vessel (d) None of above

3. The hazards of storing deck Cargo are ———— and ————

   (a) Seawater exposure and exposure to weather

   (b) fire and wind

   (c) fire and electricity

   (d) None of Above

4. ———————— means a person belonging to a testing establishment in India who is approved by the chief Inspector.

(a) Officer

(b) Competent person

(c) Authority

(d) None of Above

5. A walkaway is required to provide ————————of personnel to and from their workspaces and crewquarters.

(a) safe access

(b) safety

(c) Safe move

(d) None of Above

6. ———————— means all stationary or mobile cargo handling appliances including their permanent attachment such as cranes etc.

(a) Lifting cranes

(b) Lifting Appliances

(c) Lifting equipments

(d) None of Above

7. ———————— means the maximum slope angle of non cohesive granular material.

(a) Lyold's Register

(b) Lloyd and Register

(c) Angle of Repose

(d) Angle of deviation

8. The primary aim of ———— code is to facilitate the safe stowage and shipment of solid bulk cargoes.

(a) IMSBC

(b) ISMBC

(c) IMBSC

(d) IMSCB

9. ———— refers to any cargo space in which after loading and trimming the bulkgrain is at its highest possible level.

(a) Trimmed Compartment

(b) Filled Compartment

(c) Filled Compartment Trimmed

(d) None of Above

10. The purpose of ———— is to provide guidelines for the safe carriage of grain.

(a) Register (b) graincode

(c) Trim (d) None of Above

Part B ($5 \times 5 = 25$)

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

11. (a) Explain the Need and Importance of Inspection of Holds.

Or

(b) Explain the Need of battening of Hatch Cover.

12. (a) Discuss the main hazards and precautions with the shipment of bulk solids.

Or

(b) Discuss the hazards associated and precautions with Bulk Cargoes.

13. (a) Explain the uses of shifting boards Bundling arrangements.

Or

(b) Describe the actions to be taken to avoid the detrimental effects on bulk carriers of corrosion.

14. (a) Explain the hazards involved with the carriage of deck timber Cargo.

Or

(b) Explain Third party damage in Cargoes.

15. (a) Write the uses of IMDG Code and Cargo information.

Or

(b) Discuss the uses of segregation table precautions when handling dangerous goods.

Part C $(5 \times 8 = 40)$

Answer **all** the 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 periodical testing of Cargo gear and annealing.

17. (a) Explain the types of Bulk Cargoes.

Or

(b) Explain BLU Code : Purpose and Objectives of Bulk Carrier loading and unloading

18. (a) Explain the contents of Grain code and preparation of holds for carriage of grain cargo.

Or

(b) Explain

(i) Document of Authorisation

(ii) Contents of Grain loading booklet.

(iii) Fatigue and inadequate cargo handling

19. (a) Write the procedure in detail for receiving, tallying and delivering cargo.

Or

(b) Write the Need for

(i) Provision of walkaways

(ii) regular inspection of lashing arrangements

(iii) Controlling height

20. (a) Explain the classification, structure and uses of IMDG Code.

Or

(b) Explain the precautions during stowage, handling, loading and carriage of explosives.

———————

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fourth Semester**

**Nautical Science**

**MARINE ENGINEERING, AUTOMATION AND CONTROL SYSTEM - II**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** questions.

1. ———— and ———— are two types of fuel oils used in motor vessel.

   (a) Heavy fuel oil and Marine Diesel Oil

   (b) Heavy fuel oil and Diesel oil

   (c) Fuel oil and Marine Diesel oil

   (d) None of Above

2. ———— uses two or three main fire pumps to supply water throughout the ship for fire fighting.

   (a) Electric System (b) Control system

   (c) Fire main system (d) None of Above

3. ———— is the process of removing the exhaust gases and taking fresh air inside the engine cylinder.

   (a) scavenging (b) sewage

   (c) charging (d) None of Above

4. If supercharging is done with the help of a turbine, that is called a ————————.

(a) scavenging (b) turbocharging
(c) Lubricating (d) None of Above

5. ————————— is a human waste.

(a) Scavenging (b) Smothering
(c) Sewage (d) None of Above

6. ————————— is used to absorb the thrust which come from the movement of ship.

(a) thrust block (b) block thrust
(c) thrust (d) None of Above

7. CCP is ————————.

(a) Controllable C Propeller
(b) Controllable Pitch Propeller
(c) Controllable P Propeller
(d) None of Above

8. UMS ship means ————————

(a) Unmanned Machinery space
(b) Un Machinery Manned space
(c) Unmanned Match space
(d) None of Above

9. ————————— is a gas which does not support combustion.

(a) Rare gas (b) $CO_2$ gas
(c) Inert gas (d) None of Above

10. The four elements of fire are Air, ————, ————— and chain reaction.

(a) fuel, heat (b) fuel, water
(c) water, beat (d) None of Above

## Part B (5 × 5 = 25)

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

11. (a) Explain requirement of main and auxillary engine on board.

Or

(b) Describe safety requirements and features of Cargo Winch.

12. (a) Describe different types of exhaust gas turbocharging arrangements.

Or

(b) Explain functions of lubricating oil.

13. (a) Explain $O_2$ analyser and Explosive meter.

Or

(b) Explain the different rules and regulations of steering gear.

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

Or

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

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

Or

(b) Explain a single duct air conditioning system.

## Part C (5 × 8 = 40)

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

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

Or

(b) Explain with diagram the working principle of impulse and reaction turbine.

17. (a) Explain the Open loop and close loop Control system.

Or

(b) Explain with sketch a integral controller.

18. (a) Explain with diagram a two ram electro hydraulic steering gear.

Or

(b) Explain with diagram Rotary Vane Steering.

19. (a) Explain with diagram the working of a Windlass.

Or

(b) Explain with diagram the working and signal control system of an airwhistle.

20. (a) Explain with diagram a Vapour Compression System.

Or

(b) Explain with diagram the secondary refrigerant for cargo hold cooling.

———————

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fourth Semester**

**Nautical Science**

**METEOROLOGY**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** $(10 \times 1 = 10)$

Answer **all** questions.

1. If the distance between consecutive isobars is small then the pressure gradient is ————————.

   (a) small (b) high

   (c) neutral (d) either (a) or (c)

2. Coriolis force is ————————— at the equator.

   (a) minimum

   (b) maximum

   (c) zero

   (d) either (a) or (b)

3. Air masses are classified into how may ways?

   (a) 3 (b) 2

   (c) 1 (d) 4

4. Which of the following is a factor that affects the properties of air mass.

(a) source region (b) age

(c) Its rate of travel (d) All the above

5. ———————— Ship is equipped with a limited number of certified meteorological instruments for making observations.

(a) supplementary (b) cargo

(c) Po-Po (d) all the above

6. ————— front occurs when cold air replaces warm air.

(a) hot (b) warm

(c) cold (d) dry

7. The diameter of a Pancake-ice is ————————.

(a) 0.3 to 3m (b) 0.3 to 5 m

(c) 0.3 to 6 m (d) 0.1 to 3 m

8. An elevated part formed on a floe due to pressure is known as ————————.

(a) Pancake-ice (b) front

(c) Hummock (d) Cavitation

9. Which instrument is used to make a continuous recording of atmospheric pressure?

(a) Barograph (b) Hygrometer

(c) Barometer (d) Anemometer

10. Hydrometer is an instrument used to measure ————— of liquids based on buoyancy.

(a) speed (b) density

(c) humidity (d) air pressure

## Part B (5 × 5 = 25)

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

11. (a) Explain Genera I distribution of surface temperature.

Or

(b) Define dewpoint, absolute humidity, relative humidity.

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

Or

(b) Write about the International system of weather reporting.

13. (a) What are the warning signs of an approaching TRS.

Or

(b) Draw a synoptic pattern of an anticyclone.

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

Or

(b) Explain the effect of ocean currents on the climate.

15. (a) What are the uses and principles of Barograph.

Or

(b) Explain the principles of Hygrometer and Hydrometer.

## Part C (5 × 8 = 40)

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

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

Or

(b) Describe the methods of estimating the visibility at sea by day and by night.

17. (a) Explain source region.

Or

(b) Explain meteorological codes.

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

Or

(b) Explain anticyclone.

19. (a) What is the relationship between tides and phases of moon.

Or

(b) Explain about ocean currents.

20. (a) Write about any two ship Borne Meteorological instruments.

Or

(b) Explain Aneroid Barometer.

———————

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fourth Semester**

**Nautical Science**

**CYBER SECURITY, INTERNET OF THINGS**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** $(10 \times 1 = 10)$

Answer **all** questions.

1. ———— is a the convergence of people, processes and technology that come together to protect organizations.

   (a) Cyber space (b) Cyber Security

   (c) Cyber Law (d) None of Above

2. Authentication is one of the ————————.

   (a) Cyber Security terminology

   (b) Cyber Security Law

   (c) Cyber Security space

   (d) None of Above

3. The law governing all the instruments included in the cyber space is called ————————.

   (a) Cyber Law (b) General law

   (c) Cyber Space (d) None of Above

4. There are ———— main types of Intrusion Detection Systems.

(a) 2 (b) 3

(c) 4 (d) 5

5. Computer forensics is also called ————.

(a) Cyber forensics (b) Skill forensics

(c) Human forensics (d) None of Above

6. ———— is used to protect maritime organizations, their vessels and their cyber environment

(a) Cyber Security (b) Maritime Cyber Security

(c) Cyber Law (d) None of Above

7. ———— is the collective network of connected devices and the technology that communicates between devices and the cloud.

(a) IoT (b) IoB

(c) IoC (d) IoP

8. Paas means ————.

(a) Platform as a service

(b) People as a service

(c) Platform as a ship

(d) None of Above

9. Saas is a ————.

(a) People based service

(b) Cloud based service

(c) Water based service

(d) None of Above

10. Smart Homes and Smart City are ————————.

(a) Applications of Cyber security

(b) Applications of Internet

(c) Applications of Cyber space

(d) Applications of IoT

**Part B** $(5 \times 5 = 25)$

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

11. (a) Describe Cyber Security and its uses.

Or

(b) Explain the types of hackers.

12. (a) Explain Cyber Security Vulnerabilities.

Or

(b) Explain in detail Cyber Space and the Law.

13. (a) Explain Cyber Forensics.

Or

(b) Explain the different measures to protect against Cyber Fraud.

14. (a) Explain IoT and its evolution.

Or

(b) Describe IoT standards.

15. (a) Explain IoT in everyday life.

Or

(b) Explain the different IoT application in shipping industries.

## Part C (5 × 8 = 40)

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

16. (a) Explain the different types of Web and Cyber Attacks.

Or

(b) Explain the different Cyber Security Terminologies.

17. (a) Explain how to secure Web Applications, services and servers.

Or

(b) Explain in detail Intrusion Detection and Prevention.

18. (a) Explain and Demonstrate General Firewall Settings.

Or

(b) Analyse and explain Cyber Attacks and Cyber Netiquettes.

19. (a) Explain M2M, IoT and Big Data.

Or

(b) Explain in details challenges in IoT with respect to marine domain.

20. (a) Describe and Explain IoT and Individual Privacy.

Or

(b) Explain IoT Cloud Services, SaaS, PaaS and IaaS.

———————

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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fourth Semester**

**Nautical Science**

**BLOCK CHAIN TECHNOLOGY**

**(2023 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 1 = 10)

Answer **all** questions.

1. ———— is an advanced database mechanism.

   (a) Block Tank Technology

   (b) Block Chain Technology

   (c) Block Chain

   (d) None of Above

2. ————— is the process by which the activities of an organization are distributed or delegated away from a Central.

   (a) Decentralization

   (b) Centralization

   (c) Delegation

   (d) None of Above

3. There are ———————— types of Cryptography.

(a) 1

(b) 2

(c) 3

(d) 4

4. ————— reduce transaction bandwidth.

(a) Hash function

(b) Block Chain

(c) PoW

(d) None of Above

5. ————— is a blockchain consensus mechanism.

(a) Hash function

(b) Block Chain Technology

(c) Proof of Work

(d) None of Above

6. Composite anatomy and dispersed processes are the challenges of ————————.

(a) Block Chain Technology

(b) Block Chain Maritime Industry

(c) Proof of Work

(d) None of Above

7. ———— is a political ideology focusing in the protection of privacy and political freedom.

(a) Hash function

(b) Proof of Work

(c) Cryptoanarchy

(d) None of Above

8. ————— requires collateral in the form of staked crypto currency to become a trusted participant.

(a) Proof of Work

(b) Proof of Stake

(c) Proof of Stock

(d) None of Above

9. The intended recipient and no one else can access the information on a —————.

(a) Block chain

(b) Hash function

(c) PoW

(d) PoS

10. A cryptographic ———— is a mathematical function used in cryptography.

(a) Block chain

(b) Hash function

(c) PoW

(d) PoS

## Part B (5 × 5 = 25)

Answer **all** the question choosing either (a) or (b).

11. (a) Explain the benefits and uses of Block Chain Technology.

Or

(b) What are the various application areas of Block Chain Technology? Discuss in detail.

12. (a) Explain in detail the different types of Block chain.

Or

(b) Discuss the advantages of Public Block chain over Private Block chain.

13. (a) How do block chains use private and public key Cryptography?

Or

(b) What are the advantages of using the consensus algorithm proof of Elapsed Time instead of Proof of Work?

14. (a) Explain Block Mining.

Or

(b) Explain Block Tampering.

15. (a) How does Block Chain Technology benefit the insurance industry?

Or

(b) What are the Limitations of Block chain in Marine Industry.

**Part C** $(5 \times 8 = 40)$

Answer **all** questions Choosing either (a) or (b).

16. (a) With a neat diagram explain the generic structure of a block.

Or

(b) Explain Technological and Cryptographic Elements in Blockchain.

17. (a) Describe the requirement and operations of a Decentralized Application.

Or

(b) Describe the Business Applications and how to assess Blockchain.

18. (a) Explain Crypto-Anarchism and Cypherpunks.

Or

(b) Describe the Proof of Work (PoW) Consensus Algorithm.

19. (a) Explain the characteristics of Hyperledger Network.

Or

(b) Describe the Stake-of-Work Consensus Algorithm.

20. (a) Describe the opportunities and challenges of Block chain in Marine Industry.

Or

(b) Explain Block chain based IoT model.

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| C–4429 | Sub. Code |
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| | 11613 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025.**

**First Semester**

**Nautical Science**

**NAUTICAL MATHEMATICS – I**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** $(10 \times 2 = 20)$

Answer **all** questions.

1. Find the work done by the force $\vec{F} = 3\hat{i} + 2\hat{j} - \hat{k}$ whose displacement vector is $\hat{i} + 4\hat{j} + 2\hat{k}$ .

2. If $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{3}$, $P(A \cup B) = \frac{1}{2}$ find $P(A/B)$.

3. Define conic.

4. Show that the point (3, 2) lies on the circle $x^2 + y^2 - 5x + 3y - 4 = 0$.

5. Write the Haversine formula in general format.

6. Write Napier's rule for quadrantal spherical triangles.

7. If $y = \frac{x^2 + 1}{x^2 - 3x + 2}$ find $\frac{dy}{dx}$.

8. Evaluate $\int x \sin^{-1} x \, dx$.

9. Find the inverse of $A = \begin{bmatrix} 1 & 2 \\ 4 & 9 \end{bmatrix}$.

10. Find the rank of matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$.

**Part B** $(5 \times 5 = 25)$

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

11. (a) A variate $X$ has the probability distribution.

| $x$: | –3 | 6 | 9 |
|---|---|---|---|
| $P(X = x)$: | 1/6 | ½ | 1/3 |

Find $E(x)$ and $E(x^2)$.

Or

(b) Find the sum of the vectors $4\hat{i} + 5\hat{j} + \hat{k}$, $-2\hat{i} + 4\hat{j} - \hat{k}^n$, $3\hat{i} - 4\hat{j} + 5\hat{k}$ find also the magnitude of the sum.

12. (a) Three consecutive ordinates in a ships water plane spaced 6 m a parts are 14, 15 and 15.5 m respectively. Find the area between last two ordinates.

Or

(b) Find the centre and radius of the given sphere $2x^2 + 2y^2 + 2z^2 - 4x + 16y + 8z + 20 = 0$.

13. (a) In spherical triangle $ABC$, $a = 49^\circ 08'$, $b = 58^\circ 23.0'$ and $c = 71^\circ 20'$ . Calculate A and B.

Or

(b) State and prove supplemental theorem.

14. (a) If $x = 2\cos t - \cos 2t$, $y = 2\sin t - \sin 2t$ then prove that $\frac{dy}{dx} = \tan\left(\frac{3t}{2}\right)$.

Or

(b) Evaluate $\int \frac{x^2 + 5x + 41}{(x+3)(x-1)(2x-1)}$.

15. (a) Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & 2 \end{bmatrix}$.

Or

(b) If 3 and 15 are two eigen values of the matrix $A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$.

Find the eigen values of $A - 5I$ and $A^2$.

**Part C** $(3 \times 10 = 30)$

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

16. (a) Calculate rank correlation coefficient for the following data

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| $x$ | 48 | 33 | 40 | 9 | 16 | 16 | 65 | 24 | 16 | 57 |
| $y$ | 13 | 13 | 24 | 6 | 15 | 4 | 20 | 9 | 6 | 19 |

Or

(b) Find the centre, eccentricity, focii, lauts rectum of the following Hyperbola $9x^2 - 16y^2 - 18x - 64y - 199 = 0$.

17. (a) Prove that $\frac{\sin\frac{1}{2}(A+B)}{\cos\frac{1}{2}C} = \frac{\cos\frac{1}{2}(a-b)}{\cos\frac{1}{2}C}$.

Or

(b) If $y = a\cos(\log x) + b\sin(\log x)$, show that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 0$.

18. (a) Find eigen values and eigen vectors for $A = \begin{bmatrix} 2 & -3 & 1 \\ 3 & 1 & 3 \\ -5 & 2 & -4 \end{bmatrix}$.

Or

(b) Diagonolise the matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ using Similarity transformation.

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| C–4432 | Sub. Code |
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| | 11634 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Third Semester**

**Nautical Science**

**VOYAGE PLANNING, COLLISION PREVENTION – I**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** questions.

1. What do you understand by the term Voyage Planning?
2. Define Nautical mile.
3. Specify the units mentioned in the charts for depth.
4. Mention the documents to be collected by a ship's Master from port prior to sailing.
5. On which principle Gyro compass works on board ship?
6. What are lead lights?
7. State the floating buoys used direct the Anchoring points.
8. How will you communicate to other ships while the ship is not under command at Day?
9. Express the Arc of Mast head light.
10. What is Man overboard alarm?

## Part B (5 × 5 = 25)

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

11. (a) List down the contents in a Nautical chart.

Or

(b) Describe the position fixing by any one method.

12. (a) What actions are to be imitated if you find a wreckage at sea?

Or

(b) Explain the precautions to be taken while crossing firing practice area.

13. (a) How will you correct the ship's head error?

Or

(b) State the procedure to find information about lights in a chart.

14. (a) Explain the effect of wind ship's course.

Or

(b) Describe Set and Drift.

15. (a) State the procedure to navigate a ship in a narrow channel.

Or

(b) Explain the position fixing on the chart by its Latitude and Longitude.

## Part C

$(3 \times 10 = 30)$

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

16. (a) Write in detail about various types of Nautical charts.

Or

(b) With neat diagram explain to measure the Altitude and Angle by using Sextant.

17. (a) Explain the Regulations to avoid collision at Port.

Or

(b) What is Gyro compass? Explain its working principle.

18. (a) What actions are to be taken while the ship is under sailing in poor visibility.

Or

(b) Explain the COLREG Regulation 18.

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| C–4435 | Sub. Code 11644 |
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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fourth Semester**

**Nautical Science**

**VOYAGE PLANNING AND COLLISION PREVENTION -II**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** questions.

1. What is position line?

2. Define Flashing.

3. Write notes on sailing directions.

4. What are M and MS Notices?

5. What is Quarantine flag?

6. What is the range of sidelights and stern light.

7. Write the Morse for
   (a) Whiskey
   (b) uniform.

8. Define Traffic lane.

9. What is Radio Beacons?

10. Write about Navigational aids.

## Part B (5 × 5 = 25)

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

11. (a) What are the main features of a TSS as per Rule No.10?

Or

(b) Name all the rules of part B of the ROR and state in what conditions do they apply.

12. (a) What is the use of guide to port entry?

Or

(b) How do you differentiate between overtaking and crossing situation? Explain.

13. (a) What do you understand by "Chart projection"? Briefly explain various types of chart projection.

Or

(b) State and Explain Rule 2 of ROR.

14. (a) Explain charted height and drying height with the help of a diagram.

Or

(b) What factors are to be kept in mind while taking action to avoid collision?

15. (a) Explain about RADAR.

Or

(b) Explain about Depth and Height contours.

## Part C (3 × 10 = 30)

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

16. (a) Briefly Explain Rule 34 of the COLREGS.

Or

(b) What will be your role in passage planning as a 2nd officer?

17. (a) Explain the list of light and fog signals and radio signals.

Or

(b) What is the advice given by Rule 10 of ROR.

18. (a) Briefly explain the conduct of vessels in a Narrow Channel.

Or

(b) Why is it essential to know and recognize the distress signals? List out atleast 10 of them.

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| C–4436 |
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| Sub. Code |
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| 11651 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fifth Semester**

**Nautical Science**

**CARGO HANDLING AND STOWAGE-III**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** questions.

1. Define Timber.

2. Define Mate Receipt.

3. What in the objective of IMDC, CODE?

4. Why do you carry out regular inspection of lashing of timber deck cargo?

5. Write a short note on cargo claim?

6. What is MFAG?

7. What are the type of chemical tanker?

8. Define sea worthiness.

9. Define Timber load line.

10. Why do you require high level alarm?

## Part B (5 × 5 = 25)

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

11. (a) State the effect on stability due to absorption to water by lice accretion on Timber Deck Cargo.

Or

(b) How is the arrangement done on a Timber Deck Cargo?

12. (a) Describe the action it the cargo in lost overboard.

Or

(b) Explain the lashing arrangement of Timber. Cargo. Why should need a regular inspection on lashing on deck cargo.

13. (a) Describe the following

(i) Gravity and pressure cargo tanks

(ii) Threshold limit value (TLV)

(iii) Explain the purpose of IGC Coder.

Or

(b) Describe the following.

(i) Certificate of fitness.

(ii) Dangerous cargo manifest.

(iii) Hold space.

14. (a) What in meant by 'CHARTER PARTY' Briefly explain different Charter Parties.

Or

(b) What in meant by B/L? Briefly explain any Two B/L's.

15. (a) What are the precaution you observe when discharging IMDG CARGO?

Or

(b) What in use of "VAPOUR RETUN LINE"?.

**Part C** $(3 \times 10 = 30)$

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

16. (a) Explain the loading of "TIMBER DECK CARGO" and "STOWAGE" and "SECURING ARRANGEMENTS".

Or

(b) What are the precaution taken for loading heavy lift cargo? Explain in Detail.

17. (a) Write down different classification of IMDG Cargo.

Or

(b) What are the entries made on Cargo record book?

18. (a) Explain type A, B and C of a gas Carriers. Explain hazards to gas cargo.

Or

(b) Explain discharge procedure of a chemical tanker.

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| C–4437 |
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| Sub. Code |
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| 11652 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fifth Semester**

**Nautical Science**

**VOYAGE PLANNING AND COLLISION PREVENTION – III**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** questions.

1. Fog Signals.

2. Voyage Planning.

3. Whether Routing.

4. IALA.

5. True plot.

6. State the use of Radar.

7. What is RACON?

8. What is the concept of GMDSS?

9. What is the purposes of SART?

10. What is the purposes of EPIRB?

## Part B (5 × 5 = 25)

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

11. (a) Draw the following chart symbols.

    (i) Hospital

    (ii) Rock awash at the level of chart datum

    (iii) Wreck position approximate

    Or

    (b) Draw the chart symbols for the following

    (i) Ramark

    (ii) Triangulation point

    (iii) Church

12. (a) Give the activities of IALA Buoyage System.

    Or

    (b) Mention the importance of Collission Prevention.

13. (a) State the information usually required by the master at noon.

    Or

    (b) Give some example of when you would call the master for assistance.

14. (a) Explain True Plot and Relative Plot.

    Or

    (b) Name the rules that refers to the use of Radar. Write Rule six of ROR?

15. (a) Write briefly on planning and executing and monitoring of passage plan?

Or

(b) Briefly explain concept of GMDSS.

**Part C** $(3 \times 10 = 30)$

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

16. (a) Explain annex IV collission regulations in detail.

Or

(b) Explain Rule No. 8 and No. 9 of International Collission Rules.

17. (a) Write short note on Navigational Warning.

Or

(b) What are the contents of Indian Notices to Marianers?

18. (a) Explain with the drawing working principles of EPIRB?

Or

(b) State the working principles of SAR-SAT Navigation system.

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| C–4438 |
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| Sub. Code |
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| 11653 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Fifth Semester**

**Nautical Science**

**COMPUTER PROGRAMMING AND UTILITIES**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** the questions.

1. What is an interface?

2. What is a microprocessor?

3. Distinguish between Constructor and Destructor?

4. Define data Dictionary.

5. What is the difference between compiler and interpreter?

6. How do you declare the functions?

7. Define Network?

8. List the types of operators in C?

9. What are the application of internet?

10. List out Layers of OSI Model.

## Part B (5 × 5 = 25)

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

11. (a) Explain in details about characteristic of computer.

Or

(b) Explain about Various types of memory?

12. (a) Explain Characteristics of Database?

Or

(b) Briefly explain bout Normalizations?

13. (a) Briefly explain in detail about operators and Types? With suitable example?

Or

(b) Define Operator and Explain types of operators with suitable example program?

14. (a) Explain in detail about various Network Topologies? With neat Diagram?

Or

(b) Define Cryptography? Characteristic of Cryptography?

15. (a) Explain Program Development Life Cycle?

Or

(b) Discuss about the Standard functions in MS –Excel?

## Part C (3 × 10 = 30)

Answer **all** the questions choosing either (a) or (b)

16. (a) Explain in details about Generation of computer in details.

Or

(b) Explain in detail about Data Definition Language (DDL) and Data control language (DCL) Data Manipulation Language (DML) with suitable example.

17. (a) Explain about "While" and "do–While" looping structure in C with Suitable Example?

Or

(b) Briefly explain in details about type of network with neat Diagram.

18. (a) Explain in detail about Program Development Life Cycle?

Or

(b) What is charts discuss different types of chart used in spreadsheet with an example?

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| C–4442 | Sub. Code 11661 |
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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Sixth Semester**

**Nautical Science**

**MARINE ENVIRONMENTAL PROTECTION**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** questions.

1. What do MARPOL ANNEX-II dealt with?
2. Explain the concept of comprehensive survey conducted on board the vessel.
3. What do you understand about OPASO?
4. Write a brief notes on 15 PPM.
5. What are the contents of PART-A and PART-B of “oil record book"?
6. How often the intermediate survey and why the intermediate survey needed?
7. What are the packing materials may be used for packing the IMDG cargoes?
8. Explain Ballast water management.
9. Can you explain contents of Garbage record book?
10. Describe the word “endorsement of certificates".

## Part B (5 × 5 = 25)

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

11. (a) Write a brief Notes on “Clear Water Act”.

Or

(b) Discuss about “Liability against the Maritime pollution.

12. (a) What are the purpose of “slop tame" on board a vessel?

Or

(b) Requirement of “oil filtering equipments".

13. (a) What do you undress and about SOPEP? List few items required in the SOPED Locker.

Or

(b) Define crude oil washing and discuss about its advantages.

14. (a) Explain the requirement of shipboard ballan water treatment plant.

Or

(b) Discuss on Green house gas emission.

15. (a) How does the Anti-fouling paint prevents the shipside from corrosion?

Or

(b) Define oil/ water interface detector.

## Part C (3 × 10 = 30)

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

16. (a) Define the following Terms

(i) Port state control

(ii) SOx and NOx

Or

(b) What are the surveys conducted on board and validity of the certificates?

17. (a) Explain MARPOL ANNEXES and its regulation.

Or

(b) Describe about Garbage management plan and Garbage segregation on board ship.

18. (a) In accordance with IMDG code, define the following

(i) Marking and labeling

(ii) Limited quantity

Or

(b) What are the in formations to be recorded in the banker delivery note?

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| C–4443 |
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| Sub. Code |
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| 11662 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Sixth Semester**

**Nautical Science**

**SEAMANSHIP PRACTICES**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** the questions.

1. Name few types of ropes and the purposes.

2. What do you understand by the word “Ranging of Cable”?

3. How many ways the “STRAND” can be made to prepare a rope?

4. What are conditions we required to renew steel?

5. Write a short notes on “RUDDER”.

6. Explain the purpose of sounding.

7. How will you utilize the Tugs?

8. Name few errors that can occur during painting.

9. Where do you use the Bow line?

10. Explain the term “Let her go”?

**Part B** $(5 \times 5 = 25)$

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

11. (a) How do you choose the position for Anchoring your vessel?

Or

(b) What are precautions you should take to get your vessel for berthing?

12. (a) Name some different types of fire extinguishers and their uses.

Or

(b) How do you keep a Anchor watch in efficient manner?

13. (a) How corrosion can be prevented by cathodic protection?

Or

(b) Explain the parts of an Anchor with a diagram.

14. (a) How will you rig the Bosun chair and explain its uses?

Or

(b) What are the factors contributing to improve your ship handling skill?

15. (a) Discuss about different types of ladders used on board a ship.

Or

(b) Care and maintenance of $CO_2$ fire extinguishers.

## Part C (3 × 10 = 30)

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

16. (a) What are the jobs you may carryout during dry-dock?

Or

(b) How do you secure the ship alongside the wharf? Explain with sketch and highlight the different ropes used to moor the ship.

17. (a) Briefly explain about the construction of a ropes.

Or

(b) Why that the accuracy in draft reading is given so much importance? What are the factors which may be affecting the draft reading?

18. (a) How do you secure your vessel at berth against bad weather?

Or

(b) Procedure for launching and recovering the life boats during the drills.

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| C–4444 |
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| 11663 |

**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Sixth Semester**

**Nautical Science**

**CONVENTIONS AND REGULATIONS**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** questions.

1. What is UNCLOS?
2. Define base line.
3. What is MLC?
4. Define IAMSAR.
5. Define INMARSAT.
6. Define hot pursuit.
7. Define wreck convention.
8. Define Exclusive Economic Zone.
9. What is EEZ?
10. Define internal waters.

## Part B (5 × 5 = 25)

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

11. (a) Explain

(i) International straits.

(ii) Contiguous zone

Or

(b) List out all annexs of marpol.

12. (a) Explain in detail annex [IV].

Or

(b) Explain laws of sea tribunal.

13. (a) Explain load line certificate and requirements and its validity.

Or

(b) What is Iamsar what is the role of Iamsar?

14. (a) What is tonnage certificate and requirements and its validity?

Or

(b) List out all chapters in STCW convention.

15. (a) Explain.

(i) Settlement of disputes

(ii) Continental shelf.

Or

(b) Explain in detail the high seas legal status and freedoms.

## Part C (3 × 10 = 30)

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

16. (a) List out all solas chapters (10 )

Or

(b) Explain.

(i) International straits

(ii) Land locked states

(iii) Exclusive economic zone

17. (a) As per Iamsar explain.

(i) Williamson turn

(ii) Scharnow turn

(iii) Single turn

Or

(b) Explain.

(i) Exculsive economic zone (5)

(ii) Law of the sea tribunal (5)

18. (a) Explain Inmarsat in detail and it's functions.

Or

(b) Explain IMO in detail and their functions.

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| C–4445 | Sub. Code 11664 |
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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Sixth Semester**

**Nautical Science**

**MARITIME LAW**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** the questions.

1. What is criminal Law?
2. State the role of PSO.
3. Define Hamburg rule.
4. What do you understand by the term IMDG Code?
5. Define Marine insurance.
6. What is ISPS Code?
7. What do you understand by the term Jettison bill?
8. State Breach of contract.
9. What is the minimum age limit to become a Seaman?
10. What is the role of Director General of Shipping in India?

## Part B (5 × 5 = 25)

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

11. (a) Describe Maritime Labour Health Act 2006.

Or

(b) Enlist the certificates retained by the Register on completion of registering the ship in India.

12. (a) Explain process of taking care of property of a deceased seaman according to M.S.Act 1958.

Or

(b) Express the process of Crew engagement onboard Indian ship.

13. (a) Briefly describe the specialised agencies that regulate the Maritime Law

Or

(b) What are your duties as a 3rd officer as per ISPS?

14. (a) Write short notes on repatriation of distressed seamen.

Or

(b) Discuss the Arbitration and Conciliation Act 1996.

15. (a) Describe the roles of Lloyds agents in shipping industry.

Or

(b) State the procedure of Cargo claim settlement.

## Part C (3 × 10 = 30)

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

16. (a) What is Official log book? Enlist the entries made on it

Or

(b) Explain procedure of Indian ships registration.

17. (a) Discuss the Engagement and Discharge of seamen in India.

Or

(b) Discuss the Law of Salvage and Wreckage.

18. (a) What are Marine Insurance principles? Explain in detail.

Or

(b) Write about different types Charter parties.

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| C–4446 | Sub. Code 11665 |
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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Sixth Semester**

**Nautical Science**

**METEOROLOGY AND OCEANOGRAPHY – II**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** questions.

1. Give a short note on Barograph.
2. Define Phatic zone.
3. What do you meant by katabatic wind?
4. Define ITCZ.
5. What is an Occluded front?
6. What is synoptic hours
7. Give the characteristics of Tropical Maritime Airmass.
8. Define Vortex.
9. Give some source of meteorological data.
10. Define Routing.

## Part B (5 × 5 = 25)

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

11. (a) Write a note on green house effect

Or

(b) Describe the procedures in recording sea water temperature.

12. (a) Give a brief note on local winds.

Or

(b) Describe the process of energy interaction with atmosphere.

13. (a) Write a note on classification of airmass.

Or

(b) Describe weather associated with warm front.

14. (a) Difference between weather routing and climatological routing.

Or

(b) Write the warming signs of an approaching TRS.

15. (a) Describe about the structure of weather bulletin.

Or

(b) Give a note on Stevenson's Screen.

## Part C (3 × 10 = 30)

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

16. (a) Describe in detail about the principle and use of Aneroid Barometer.

Or

(b) Briefly describe the major meteorological instruments onboard.

17. (a) Define TRS and explain the particular rules of navigation for maneuvering in the vicinity of TRS.

Or

(b) Describe the factors influencing weather routing its advantages and limitations.

18. (a) Decode the following weather report by using ships weather code.

| | | | | | |
|---|---|---|---|---|---|
| BBXX | PSVG | 15123 | 99512 | 30764 | 41398 |
| 62828 | 10143 | 20082 | 40274 | 56032 | 76364 |
| 85524 | 22245 | 00201 | 20703 | 310// | 40812 |

Or

(b) Define Airmass, describe the factor governing the development of airmass and explain the airmass modifying factors.

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| C–4447 | Sub. Code 11666 |
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**B.Sc. DEGREE EXAMINATION, APRIL 2025**

**Sixth Semester**

**Nautical Science**

**NAVIGATION – V**

**(2016 onwards)**

Duration : 3 Hours Maximum : 75 Marks

**Part A** (10 × 2 = 20)

Answer **all** questions.

1. What is Gyro compass?
2. How will you take reading in Compass at night times?
3. State the influence of Radar in ship's navigation.
4. Expand RADAR.
5. What is NAVSTAR.
6. How does the GPS work?
7. Describe the purpose of EPIRB.
8. State the use of GMDSS.
9. What do you understand by the term 'VDR'?
10. Explain the Pythagoras error in Echo sounder.

## Part B (5 × 5 = 25)

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

11. (a) How does the AIS help in ship's navigation?

Or

(b) Explain the coefficient of Compass.

12. (a) Describe the working principle of RADAR.

Or

(b) How does the earth's magnetic field affect variation of the compass?

13. (a) Describe the working principle of NAVSTAR.

Or

(b) State the working principle of GDOP and its accuracy.

14. (a) Describe the ranges of GPS.

Or

(b) Explain the maximum and minimum depths required to obtain accuracy in Echo sounder.

15. (a) Enumerate the information available in AIS system during voyage.

Or

(b) How will you exchange the data ship-to-ship situation?

## Part C (3 × 10 = 30)

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

16. (a) Explain the segments of GPS with simplified block diagram.

Or

(b) With an aid of neat sketch explain the working principle of Echo Sounder.

17. (a) Explain the various ways and means available for safe voyages for merchant vessels.

Or

(b) How does phasing assist and affect accuracy to obtain depths at long ranges?

18. (a) Calculate the value of coefficient A. If the following deviations were known to exist:

| Comp Hdg: | N | N | E | E | SE | S | SW | W | NW |
|---|---|---|---|---|---|---|---|---|---|
| Deviation: | 8°E | 3°F | 2°W | 5°W | 1°W | 5°F | 2°F | 1°W | |

Or

(b) While steering 044°(T) and l6 knots the following observations were made on the radar screen:

| Ship's time | Bearings | Range (M) (T) |
|---|---|---|
| 1100 | 004° | 6.5 |
| 1200 | 005° | 6.0 |
| 1230 | 004° | 5.6 |

Find:

(i) CPA and TCPA

(ii) Course and speed of target

(iii) Aspect at 0945.

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