C–5819	Sub. Code 11613

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. All Tanker ship must have

   (a) pumps and pipings

   (b) double bell

   (c) inert gas system

   (d) all of the above

2. _____ can provide safe and efficient services to the exporters and importers in an effective manner.

   (a) ship (b) modern port

   (c) old port (d) none

3. _____ means the raise of a ships.

   (a) sheer of deck (b) curvature

   (c) deck fore (d) none

4. The outer diameter of the plimsoll mark should be of _____.

(a) 250 mm (b) 30 mm

(c) 400 mm (d) none

5. The purpose of loadline is to ensure the _____.

(a) water depth

(b) air draft

(c) ensure sufficient free board of ship

(d) none

6. _____ is used to reduce the damp rolling motions.

(a) steering gear (b) bilage keel

(c) bilges (d) none

7. Choose the correct compartment which is an enclosed space.

(a) chain locker (b) boscon's store

(c) navigation store (d) none

8. The term striker plate is associated with _____.

(a) bull work (b) chain locker

(c) sounding pipe (d) none

9. Time zones are based on _____.

(a) latitude (b) longitude

(c) equator (d) none

10. Tide involves water moving _____.

(a) back and forth (b) up and down

(c) no moves (d) none

Part B (5 × 5 = 25)

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

11. (a) Explain the existence of old harbours and the need of modern ports.

Or

(b) Explain crude oil tanker, product tanker, LPG and LNG.

12. (a) Explain the marine terms

(i) Rake of stern,

(ii) Air draft and

(iii) Amidships.

Or

(b) Explain the load line, baseline, bilge radius, stern and trim.

13. (a) Explain the purpose and location of engine casing.

Or

(b) Explain the purpose and location of various stores.

14. (a) Explain the purpose of framing and shell plating.

Or

(b) Demonstrate the identification of plates with details.

15. (a) Explain the impact of tides and winds.

Or

(b) Explain international deteline and time zone.

Part C (5 × 8 = 40)

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

16. (a) Explain in brief the development of modern merchant ships.

Or

(b) Explain the basic features and purpose of passenger ship and general cargo ship.

17. (a) Sketch and explain the plimsoll line.

Or

(b) Explain and demonstrate reading draft.

18. (a) Describe the layout of superstructure.

Or

(b) Explain the layout and midship section of container ship.

19. (a) Sketch and describe the purpose of peak tanks and wing tanks.

Or

(b) Sketch and explain the various types of ventilators.

20. (a) Describe, time zone, areas of bad weather, sea water density and loadline zones.

Or

(b) Explain the impact of climate and sea water density on ships and shipping.

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C–5820

Sub. Code
11614

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

First Semester

Nautical Science

NAVIGATION – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. The straight between France and England is called _____.

   (a) Equator

   (b) Pole

   (c) Dover

   (d) None

2. Dalt from 5°S to 2°N is _____.

   (a) 5°N (b) 7°N

   (c) 7°S (d) None

3. Mean lat between 18°N to 28°N is _____.

   (a) 20°N (b) 22°N

   (c) 23°N (d) None

4. The shape of earth can be described as _____.

(a) Speroid

(b) Elliptical

(c) Circle

(d) None

5. The meridian chosen to be the reference for measuring longitudes is called _____.

(a) Dover

(b) Latitude

(c) Greenwich

(d) None

6. The angle between Magnetic North and Compass North is named as _____.

(a) Compass Error

(b) Right angle

(c) Latitude

(d) None

7. The Great Circle intersects Meridian of the vertex at _____.

(a) 45° (b) 60°

(c) 90° (d) None

8. Geographical Mile is the length of the arc of the _____ subtending an angle of *i* at the centre of earth.

(a) Mean

(b) Equator

(c) Meridian

(d) None

9. The distance between two parallel latitudes using minutes of longitude is called _____.

(a) AMP

(b) DMP

(c) MDP

(d) None

10. A ship is steering a course of 270° and a northerly wind is causing a leeway of 4°. The effective course will be _____

(a) 250° (b) 260°

(c) 266° (d) None

Part B (5 × 5 = 25)

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

11. (a) (i) What is Meridonial parts? Give examples.

(ii) What is estimated position?

Or

(b) Explain difference of latitude and different of longitude.

12. (a) Describe the direction on the earth surface.

Or

(b) Find the compass Error (CE)

	(1)	(2)
Deviation	5°E	4°W
Variation	16°W	4°W
Compass Error	–	–

13. (a) Define Quadrantal course and True course with sketch.

Or

(b) Demonstrate the uses of plane sailing formulae.

14. (a) Explain Refraction and Natural scale of a chart.

Or

(b) Explain the relationship between D'long and DMP.

15. (a) Find the course and distance

Lat A : 44°44S Long A : 154°30E
Lat B : 44°44S Long B : 179°50E

Or

(b) Describe the uses of gnomonic chart for plotting the great circles between two points.

Part C (5 × 8 = 40)

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

16. (a) Describe the approximate polar and Equatorial circumferences of the earth.

Or

(b) Describe the earth as an ellipsoid.

17. (a) Define :

(i) Compass Error

(ii) True Magnetic

(iii) Compass North

(iv) True Course

(v) Compass Course.

Or

(b) Find the course and distance.

Latitude A	Longitude A	Latitude B	Longitude B
04°16.OS	177°37.OW	02°29 ON	179°24.OE

18. (a) Derive the final position and demonstrate the uses of plane sailing formulae.

Or

(b) Derive the final position after sailing along a parallel of latitude.

19. (a) Describe the principles of construction of Mercator chart.

Or

(b) Describe the requirements of chart for Marine Navigation.

20. (a) Explain the procedure to transfer a great circle from a Gnomonic chart to a Mercator chart.

Or

(b) Describe the principles of Gnomonic projection. Describe the use of gnomonic chart for plotting the great circles between two points.

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C–5821

Sub. Code
11615

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

First Semester

Nautical Science

NAUTICAL MATHEMATICS – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. The father of spherical trigonometry is.

   (a) Pythagoras (b) Hipparchus

   (c) Thalus (d) Aryabatta

2. Haversine formula is derived from ———————— formula.

   (a) Sine (b) Cosine

   (c) tangent (d) Secant

3. ———————— triangle is a spherical triangle created by the arcs of three great circles.

   (a) Right angled (b) Spherical

   (c) Quadrantal (d) Polar

4. According to Napier's rule, sine of any part is equal to the product of the ———————— of the opposite parts.

(a) Sine (b) Cosine

(c) Tangent (d) Secant

5. $\sqrt{x+4y}$ is a homogeneous function of degree ————————.

(a) 1 (b) 0

(c) $\frac{1}{2}$ (d) 2

6. If $u = x^2 + y^2$ then $\frac{\partial^2 u}{\partial x \partial y}$ = ————————.

(a) $2x$ (b) $2y$

(c) x^2 (d) 0

7. $\Gamma(1)$ = ————————.

(a) 1 (b) 0

(c) π (d) 2

8. $\beta(m,n)$ = ————————.

(a) $\frac{\lfloor (m) \rfloor (n)}{\lfloor (m+n)}$ (b) $\frac{\lfloor (m) \rfloor (n)}{\lfloor (m-n)}$

(c) $\frac{\lfloor (m) \rfloor (n)}{\lfloor (mn)}$ (d) $\frac{\lfloor (m) \rfloor (n)}{\lfloor (n)}$

9. Let A be any square matrix such that $AA^{-1} = I$ then A is said to be ————————.

(a) Nilpotent (b) Idempotent

(c) Orthogonal (d) Symmetric

10. Then rank of $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is ————————.

(a) 2 (b) 1

(c) 0 (d) ∞

Part B (5 × 5 = 25)

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

11. (a) What is Haversine formula?

Or

(b) Define

(i) Great circle

(ii) Spherical Angle.

12. (a) In spherical triangle LMN, $L = 88^\circ 24 \cdot 5'$ $n = 100^\circ 09'$, $M = 97^\circ 46'$ find l, m and N.

Or

(b) Explain Quadrant spherical triangle.

13. (a) If $v = (x^2 + y^2 + z^2)^{1/2}$ prove that $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} + \frac{\partial^2 v}{\partial z^2} = 0$.

Or

(b) If $\nabla u = 2r^4 (x\vec{i} + y\vec{j} + z\vec{k})$ then find u.

14. (a) Evaluate $\int_0^1 \int_x^{\sqrt{x}} (x^2 + y^2)\, dx\, dy$.

Or

(b) Express $\int_0^{\pi/2} \sqrt{\tan\theta}\, d\theta$ interms of gamma function.

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

Or

(b) Check whether the vectors (1, 1, 1, 3), (1, 2, 3, 4) and (2, 3, 4, 9) is linearly independent or not.

Part C (5 × 8 = 40)

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

16. (a) In spherical triangle WXY, $w = 88^\circ 24 \cdot 5'$, $x = 98^\circ 10'$, $y = 100^\circ 09'$. Find w and x.

Or

(b) In spherical triangle CDE, calculate the angle C, D and E if $c = 87^\circ 10'$, $d = 62^\circ 37'$, $e = 100^\circ 10'$.

17. (a) In spherical triangle RST, $t = 80^\circ 32'$, $r = 60^\circ 40'$ and $T = 90^\circ$ Find S, s and R.

Or

(b) In spherical triangle PQR, $PQ = 52^\circ 11'$, $Q = 69^\circ 47'$, $QR = 90^\circ$ Find P, Q and PR.

18. (a) if $u = \sin^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$. Prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \frac{1}{2}\tan u$ and $x^2\frac{\partial^2 u}{\partial x^2} + 2xy\frac{\partial^2 u}{\partial x \partial y} + y^2\frac{\partial^2 u}{\partial y^2} = -\frac{\sin u \cos 2u}{4\cos^3 u}$

Or

(b) If $\vec{R} = x\vec{i} + y\vec{j} + z\vec{k}$ then show that

(i) $\nabla \cdot \vec{R} = 3$

(ii) $\nabla \times \vec{R} = 0$.

19. (a) Evaluate $\int_{-a}^{0}\int_{0}^{\sqrt{a^2-y^2}} f(x,y)\,dx\,dy$ by changing the order of integration.

Or

(b) State and prove the relation between beta and gamma function.

20. (a) Find the value of k for which the system of equation

$(3k-8)\,x+3y+3y+3z=0$, $3x+(3k-8)\,y+3z=0$,

$3x+3y+(3k-8)z=0$ has a non-trivial solution.

Or

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

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C–5822

Sub. Code
11616

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

First Semester

Nautical Science

NAUTICAL PHYSICS AND ELECTRONICS – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Which of the following materials display higher magnetic susceptibility?

   (a) Ferromagnetic material

   (b) Paramagnetic material

   (c) Diamagnetic material

   (d) Electromagnetic material

2. For solids and liquids specific heat _____ the process.

   (a) Depends (b) Independent

   (c) May depend (d) May not depend

3. If the refractive index of air, water and crown glasses are n_1, n_2 and n_3 respectively then _____.

   (a) $n_1 < n_2 = n_3$ (b) $n_1 > n_2 > n_3$

   (c) $n_1 = n_2 < n_3$ (d) $n_1 < n_2 < n_3$

4. When the loudness of the ringtone of the mobile phone is increased, the frequency of ringtone _____.

(a) Increases (b) Decreases

(c) Remains same (d) Cannot be determined

5. According to the principle of buoyancy a body totally or partially immersed in a fluid will be lifted up by a force equal to _____.

(a) The weight of the body

(b) More than weight of the body

(c) Less than the weight of the body

(d) Weight of the fluid displaced by the body

6. On deforming a body, the restoring force that acts per unit area is known as _____.

(a) Strain (b) Density of force

(c) Stress (d) Youngs modulus

7. Zener diode is preferred for _____.

(a) Self coupling

(b) AC coupling

(c) AC and DC coupling

(d) DC coupling

8. The emitter - base junction of a transistor is _____ biased while the collector-base junction is _____.

(a) Reverse, Forward (b) Reverse, Reverse

(c) Forward, Forward (d) Forward, Reverse

9. Miller integrator voltage sweep generator uses _____.

(a) Negative feedback

(b) Positive feedback

(c) Both negative and positive feedback

(d) Neutral feedback

10. A crystal oscillator generates electrical oscillation of constant frequency based on the _____ effect.

(a) Ultrasonic (b) Magnetic

(c) Piezoelectric (d) Photoelectric

Part B (5 × 5 = 25)

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

11. (a) Define the following terms :

(i) Magnetic field

(ii) Magnetic pole.

Or

(b) Explain the laws of reflection.

12. (a) Explain Pascal law and its applications.

Or

(b) What are the different types of semi conductors?

13. (a) What is LC, RC and Crystal Oscillators?

Or

(b) Derive Boolean Algebra.

14. (a) Explain the need of modulation.

Or

(b) Explain the demodulation of A.M. Wave.

15. (a) Explain in short about satellite links.

Or

(b) What is interfacing device?

Part C (5 × 8 = 40)

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

16. (a) Explain the heat transfer mechanism.

Or

(b) Discuss the factors which affect velocity of sound in seawater and in air.

17. (a) Explain Air bubbles in liquid.

Or

(b) Explain the construction and symbol of p-n junction diodes with their characteristics.

18. (a) Define current gain α and β of a transistor and its relation.

Or

(b) Explain the working principles of logic gates.

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

Or

(b) Derive side bands in F.M.

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

Or

(b) Write about microprocessors.

C–5824

Sub. Code
11624

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Second Semester

Nautical Science

SHIP OPERATION TECHNOLOGY

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. _____ includes location of engine room, pump room and all engine related items.

   (a) Service space

   (b) Machinery space

   (c) Stowage space

   (d) Safe room

2. Which paint is applied in chain lockers?

   (a) Yacht (b) Antifouling

   (c) Bituminous (d) Fiberglass

3. What is the working time duration of SCBA set?

   (a) 10 minutes (b) 20 minutes

   (c) 30 minutes (d) 15 minutes

4. Which is an example of whipping of ropes?

(a) Common whipping

(b) Sail makers whipping

(c) Palm whipping

(d) All the above

5. _____ is used to fasten two rope together or a rope to a ring.

(a) Knots (b) Bends

(c) Hatches (d) Halyards

6. The rope by which the flags are hoisted is known as

(a) Halyards (b) Moorling line

(c) Bends (d) Either (a) or (b)

7. Flag Q is known as _____ flag.

(a) Ensign (b) Quarantine

(c) Zulu (d) Bravo

8. How many numerical pendants are there?

(a) 15 (b) 11

(c) 10 (d) 7

9. Pick out the risk involved in mooring station.

(a) Slips (b) Trips

(c) Falls (d) All the above

10. _____ permit is used when working at a height while the ship is sailing.

(a) Working aloft (b) Cold work

(c) Hot work (d) Electric work

Part B (5 × 5 = 25)

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

11. (a) State the names and timing of watches.

Or

(b) Explain chemical suits and safety goggle.

12. (a) Explain the care and maintenance of fibre ropes.

Or

(b) Explain the use of chain stoppers.

13. (a) Describe Halyard at the dip.

Or

(b) Explain Jack flag and Quarantine flag.

14. (a) Describe the procedure to rescue from enclosed spaces.

Or

(b) List safety precautions while anchoring.

15. (a) Explain the importance of personnel health on board ship.

Or

(b) What is hot work permit and cold work permit?

Part C

(5 × 8 = 40)

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

16. (a) List the names of various parts of ship.

Or

(b) What are the personal protective equipment?

17. (a) What the different types of material used in construction of ropes?

Or

(b) Explain different types of mooring ropes and their advantages.

18. (a) How to dress the ship?

Or

(b) Explain the types of Ensigns.

19. (a) Explain the procedure of manual lifting and carrying of weights.

Or

(b) List the precautions while working with compressed air and spray painting machine.

20. (a) What is the role of safety committee and safety officer in maintaining safety standards on board?

Or

(b) Explain the different types of permits.

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C–5825	Sub. Code 11625

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.

Second Semester

Nautical Science

NAUTICAL MATHEMATICS – II

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. The period of a cosine function is _____.

(a) π (b) 2π

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

2. If $F(s)$ is a Fourier transform of $f(x)$ then $\int_{-\infty}^{\infty}|f(x)|^2dx =$ _____.

(a) $\int_{-\infty}^{\infty}|F(s)|^2ds$ (b) $\int_{0}^{\infty}|F(s)|^2ds$

(c) $\int_{-\infty}^{0}|F(s)|^2ds$ (d) $\int_{-\infty}^{\infty}|F(s)|ds$

3. $L^{-1}\left(\frac{1}{s-a}\right) =$ _____.

(a) e^{-at} (b) $\sin at$

(c) e^{at} (d) $\cos at$

4. $L(1) =$ _____.

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

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

5. What is the range of the data : 1, 2, 4, 8, 9, 9, 10?

(a) 10 (b) 9

(c) 8 (d) 5

6. What is the mode for the data: 1, 1, 3, 5, 7, 10, 11, 12, 12, 12

(a) 12 (b) 9

(c) 1 (d) 10

7. $\Delta\nabla =$ _____.

(a) $\nabla\Delta$ (b) ∇

(c) Δ (d) $\Delta = E\Delta$

8. Shift operator is _____.

(a) Δ (b) ∇

(c) E (d) δ

9. Error in trapezoid rule is _____.

(a) h^3 (b) h

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

10. The order of error in simpson's $\frac{1}{3}$ rule is _____.

(a) h^3 (b) h

(c) h^3 (d) h^4

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

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

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

Or

(b) Find the Fourier coefficient of the function $f(x) = x^2$ where $0 < x < 2\pi$.

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

Or

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

13. (a) Obtain the mean and median for the following data.

x :	1	2	3	4	5	6	7	8	9
y :	8	10	11	16	20	25	15	9	6

Or

(b) Find the rank correlation coefficient for the marks obtained by 10 students in physics and chemistry.

Physics :	35	56	50	65	44	38	44	50	15	26
Chemistry :	50	35	70	25	35	58	75	60	55	35

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

x :	0	1	2	3	4
y :	8	11	9	15	6

Or

(b) Prove that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$.

15. (a) Use Lagrange's interpolation formula to find the value of y at $x = 6$ for the following data.

x :	3	7	9	10
y :	168	120	72	63

Or

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

Part C (5 × 8 = 40)

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

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

Or

(b) Find the half range cosine series for the function $f(x)=x^2$ in $0\le x\le\pi$.

17. (a) Find the Laplace transforms of $t^2+\cos 2t+\sin^2 2t$.

Or

(b) Find $L^{-1}\left[\dfrac{s^2-s+2}{s(s-3)(s+2)}\right]$.

18. (a) Find the Quartile deviation and standard deviation for the following data

Class intervals :	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency :	6	5	8	15	7	6	3

Or

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

x :	1	2	3	4	5	6	7	8	9
y :	9	8	10	12	11	13	14	16	15

19. (a) Find a real root of the equation $x^3-x-11=0$ using bisection method.

Or

(b) Find the real root of $x^3 - 3x + 1 = 0$ lying between 1 and 2 upon three decimal place by Newton's method.

20. (a) Evaluate $\int_0^{10} \frac{dx}{1+x^2}$ using

(i) Trapezoidal rule

(ii) Simpson's one third rule.

Or

(b) Construct Newton's forward interpolation polynomial for the following data

x :	4	6	8	10
y :	1	3	8	16

C–5826

Sub. Code
11626

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Second Semester

Nautical Science

NAUTICAL PHYSICS AND ELECTRICITY – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. The property of a coil which enables to produce an opposing induced emf in it when the circuit in the coil changes is called ————————.

   (a) self induction (b) mutual induction

   (c) induction (d) impedance

2. The unit of magnetic flux is ————————.

   (a) Weber

   (b) Watt

   (c) Newton metre square

   (d) Ohm

3. Q factor of a series resonant circuit is the ratio of the voltage across a coil to ————————.

   (a) Applied current (b) Applied voltage

   (c) A hertz (d) Unit Ohm

4. The unit of impedance is ————————.

(a) Weber (b) Ohm

(c) Watt (d) Tesla metre square

5. Power is ———————— in unit time.

(a) displacement (b) energy given

(c) work done (d) force given

6. The algebraic sum of the products of resistance and current in each part of any closed circuit is ———————— to the algebraic sum of the emf's in that closed circuit.

(a) greater (b) lesser

(c) equal (d) either (a) or (b)

7. In heater the resistance value is ————————.

(a) low (b) very high

(c) neutral (d) zero

8. Fuse has ———————— melting point.

(a) low (b) high

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

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

(a) spray can

(b) space rockets

(c) car carburetors

(d) all the above

10. Pick out the applications of transducer.

(a) Microphone (b) Loudspeakers

(c) Antenna (d) All the above

Part B (5 × 5 = 25)

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

11. (a) Explain Faraday-Lenz's law.

Or

(b) Explain self and Mutual inductance.

12. (a) Describe static electricity precaution.

Or

(b) Explain Resonance frequency and power factor.

13. (a) Explain Q of a coil.

Or

(b) Applications of Wheatstone bridge – Describe

14. (a) Explain Kirchoff's 2nd Law.

Or

(b) Explain constant voltage and current source.

15. (a) Explain Thermister and its applications.

Or

(b) What is the principle and application of fuses?

Part C

(5 × 8 = 40)

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

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

Or

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

17. (a) Describe resistances 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 principle and working of AC motor and DC generator.

Or

(b) Describe the heating effect of current and thermoelectric effect.

———————

C–5827	Sub. Code 11628

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. EBCDIC means _____.

   (a) Extended Binary Coded Decimal Interchange Code

   (b) Extended Binary Coded Decimal Information Code

   (c) Extended Binomial Coded Decimal Interchange Code

   (d) Extended Binomial Coded Decimal Information Code

2. The 2's complement of 10101 is _____.

   (a) 01010 (b) 01011

   (c) 01001 (d) 01100

3. _____ storage is directly accessible by the CPU and has a smaller capacity.

   (a) Secondary (b) Optical

   (c) Primary (d) HDD

4. _____ translates the code line by line during execution.

(a) Interpreter (b) Compiler

(c) Sourcar (d) Scripter

5. _____ allows an individuals to make online transactions using digital currency.

(a) Digital cash (b) Debit cards

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

6. e-cash is a digital currency that allows for the secure and untraceable transfer of funds. [True/False]

7. To find arithmetic mean for group of numbers, _____ function is used in Excel.

(a) SUM (b) MIN

(c) AVERAGE (d) COUNT

8. Which chart is used to show the relationships between three measures?

(a) Bar chart (b) Bubble chart

(c) Area chart (d) Scatter chart

9. Pick out the data files type in Python.

(a) Text file (b) Binary file

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

10. Looping means executing something only once in a program. [True/False]

Part B (5 × 5 = 25)

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

11. (a) Convert 10001101_2 to hexadecimal system.

Or

(b) Explain ASCII code.

12. (a) Explain main memory and secondary memory.

Or

(b) Explain Assembler and Interpreter.

13. (a) Explain Internet and Intranets.

Or

(b) What is Dig Cash?

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

Or

(b) How will you insert tables and charts in PPT?

15. (a) What are python operators?

Or

(b) Explain about if condition.

Part C

(5 × 8 = 40)

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

16. (a) Explain number system.

Or

(b) Explain binary codes.

17. (a) Explain different types of memory.

Or

(b) Explain different languages of a computer.

18. (a) Explain E-Commerce.

Or

(b) Explain cyber cash.

19. (a) How will you use formulas in MS-WORD?

Or

(b) How will prepare live presentations?

20. (a) Explain loop control statement.

Or

(b) Explain file handling using python.

———————

C–5828

Sub. Code
11629

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Second Semester

Nautical Science

METEOROLOGY AND ENVIRONMENTAL STUDIES

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Maximum human impact on environment is visible in

   (a) Rural Area (b) Urban Area

   (c) Town (d) City

2. Heat energy released at the time of condensation is _____

   (a) Latent heat (b) Specific heat

   (c) Convection (d) Either (a) or (b)

3. Nimbostratus cloud produces heavy rain accompained by lightning and thunder. (True or False)

4. The average atmospheric pressure at sea level is _____.

   (a) 1043.2 MB (b) 1000 MB

   (c) 1013.2 MB (d) 2000 MB

5. Stratopause is a layer separating the Troposphere and Stratosphere. (True or False)

6. Chemicals like sulphur dioxide and nitrogen dioxide are produced when fossil fuels are burned. (True or False)

7. _____ cloud is an example of mid-level cloud.

(a) Cirrocumulus (b) Altocumulus

(c) Nimbostratus (d) Stratus

8. Global warming is the effect of Green house effect. (True or False)

9. In nature the abiotic components consist of a water, sunlight and the biotic components are animals, plants and insects. (True or False)

10. _____ is the incoming radiation from sun.

(a) Insolation (b) Infra red

(c) Ultraviolet (d) Gamma

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

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

11. (a) What is the use of alternate energy source?

Or

(b) Explain the role of an individual in conservation of natural resources.

12. (a) Explain food web and ecological pyramids.

Or

(b) What are the threats of biodiversity?

13. (a) What is the role of an individual in prevention of pollution?

Or

(b) Explain water conservation.

14. (a) Describe the nature of solar radiation.

Or

(b) Explain the Green house effect.

15. (a) Explain the differences between apparent and true wind.

Or

(b) Describe the need for and define condensation nuclei.

Part C (5 × 8 = 40)

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

16. (a) Explain water resources.

Or

(b) Explain land resources.

17. (a) Describe the structure and function of an ecosystem.

Or

(b) Explain the value of biodiversity.

18. (a) Explain the causes, effects and control measures of marine pollution.

Or

(b) Explain Disaster management.

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

Or

(b) Explain the Green house effect and global warming.

20. (a) Explain Coriolis force and cyclostrophic winds.

Or

(b) List and describe the basic cloud types.

———————

C–5829	Sub. Code 11633

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Third Semester

Nautical Science

NAVIGATION - II

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. What is the radius of celestial sphere?

   (a) Infinite (b) 3×10^8 light year

   (c) 2×10^8 light year (d) 6×10^8 light year

2. Vertical circle is ———— on the celestial sphere passing through the observer's Zenith and Nadir.

   (a) Pole (b) Azimuth

   (c) Great circle (d) Unit circle

3. The maximum elongation of Venus is ————.

   (a) 49 ® (b) 46 ®

   (c) 47 ® (d) 48

4. The distance of Earth from Sun is ————.

   (a) 90×10^6 miles (b) 92×10^6 miles

   (c) 94×10^6 miles (d) 93×10^6 miles

5. RA means ————————.

(a) Right Ascension (b) Right angle

(c) Rate Ascension (d) Rate Angle

6. SHA means ————————

(a) Sidereal Hour Angle

(b) Sidereal Hour Ascension

(c) Super Hour Angle

(d) Super Hour Ascension

7. To an observer the Sun's LHA was 290® , GHA was 40®, then the observer's longitude is

(a) 110ⓇW (b) 110ⓇE

(c) 100ⓇE (d) 100ⓇW

8. GMT means ————————.

(a) Greenwich Mean Time

(b) Green Mean Time

(c) Greenwich Mean Tight

(d) Green Mean Tight

9. Visibile horizon is the small circle on the earth's surface bounding the observer's field of vision at sea. (Say True / False).

10. GHA +/– Long = SHA (Say True / False)

Part B (5 × 5 = 25)

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

11. (a) Explain Kepler's law of planetary motion.

Or

(b) Describe the significance of Arctic and Antartic circles.

12. (a) Define zone time and Greenwich time.

Or

(b) Define local hour angle and sidereal hour angle.

13. (a) What are the uses of altitude and low altitude correction tables in nautical almanac?

Or

(b) How will you recognise the parts of PZX triangle?

14. (a) Describe the relationship between altitudes of elevated pole and the latitude of the observer.

Or

(b) Calculate the polar distance of a star with a declination of (i) 20º 15' South (ii) 45º30' North

15. (a) Determine the LHA of the star Sirius on January 20, 2023, at 02.00 GMT for an observer located at 120ºW longitude.

Or

(b) Find the LHA for Aries on April 15, 2023 at 12.00 GMT for an observer located at 75ºE longitude.

Part C (5 × 8 = 40)

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

16. (a) Describe Celestial sphere.

Or

(b) Explain the phases of moon.

17. (a) What is International Data Line? How clocks are adjusted when a ship crosses an INTERNATIONAL DATE LINE?

Or

(b) Find the LMT at a place in longitude 66°W, the time zone of which is 104h oom at 18h 40 m standard time.

18. (a) State the optical principles of the sextant and show how the sextant measures double the angle through which the index bar is moved.

Or

(b) Define the following : (i) Rational horizon (ii) Zenith and Nadir (iii) Elevated pole (iv) Depressed pole.

19. (a) On 1st May 1992 in DR longitude 179°58' E South of the Sun's LL on the meridian was 64°35.9' South of the observer. If HE was 15 m find the latitude and the PL.

Or

(b) Describe the direction of the position line through the observer when taking a meridian altitude.

20. (a) Describe the information contained in Nautical Almanac.

Or

(b) Derive LHA of star from the LHA of Aries and SHA of the star.

———————

C–5830	Sub. Code 11634

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. _____ is the total mass of the ship when she is floating in salt water with her summer loadline at the water surface.

   (a) Load displacement

   (b) Deadweight

   (c) Displacement

   (d) None

2. _____ is the mass of the ship at present.

   (a) Load displacement

   (b) Light displacement

   (c) Present displacement

   (d) None

3. The length and breadth of the water-plane of a ship are 100 m and 12 m. If the coefficient of fineness of the water-plane is 0.7, Find her TPC in SW.

   (a) 8.41 (b) 8.61

   (c) 8.51 (d) None

4. _____ is the increase in draft when a ship goes from SW to FW and viceversa.

(a) FWA (b) DWA

(c) WNA (d) None

5. What is the thickness of lines in loadline?

(a) 30 mm (b) 35 mm

(c) 25 mm (d) None

6. A ship's load displacement is 16000t and TPC is 20. If she is in DW of RD 1.010, find by how much she may immerse her loadline so that she will not be overaloded when she goes to sea.

(a) 11 cm (b) 12 cm

(c) 13 cm (d) 14 cm

7. When a weight is removed, the COG of the ship moves _____ away from the COG of the removed weight

(a) Directly (b) Indirectly

(c) Towards (d) None

8. On a vessel of 6000*t* displacement KG 7.4 m, how may tonnes of Cargo may be discharged from the lower hold (KG 2.0 m) in order to have a final KG of 8.0 m?

(a) 500 *t* (b) 400 *t*

(c) 600 *t* (d) None

9. _____ is the transverse inclination caused by unequal distribution of weights on either side of the centre line of the ship.

(a) List (b) Heel

(c) Bilge (d) None

10. _____ is the transverse inclination of the ship caused by external forces such as wind, waves.

(a) List (b) Heel

(c) Bilge keel (d) None

Part B (5 × 5 = 25)

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

11. (a) Define Reserve Buoyancy as the water enclosed volume which provides buoyancy in case vessel.

Or

(b) Define Load Displacement, Light Displacement and Dead weight.

12. (a) Define centre of Buoyancy and factors affecting the same.

Or

(b) Define centre of Floatation and factors affecting its position.

13. (a) State the Wall sided formula for calculating Righting Level for large angles of heel.

Or

(b) Calculate Moment of statical stability for small as well as large angles of heel.

14. (a) Define list as the transverse inclination caused when the COG of the ship is off the centre line.

Or

(b) Calculate list while loading, discharging and shifting weights.

15. (a) M.V. Hinship is floating at a draft of F 5.65 m, A 7.45 m. Calculate (i) her hydrosatic draft, (ii) her displacement.

Or

(b) M.V. Hindship is in condition No. 2. Find the shift of her CG if 100 tonnes of Cargo is shifted transversely over a distance of 10 m. Also find the Resulting List.

Part C (5 × 8 = 40)

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

16. (a) Explain Archimedes principles and the principles of Floatation.

Or

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

17. (a) Determine the position of the longitudinal centre of Gravity (LCG) of a ship for different conditions of load and ballast using moments about the Aft perpendicular.

Or

(b) Explain the effect on the position of centre of gravity of a ship by adding removing and/or shifting weights.

18. (a) Draw the midship diagram for a box shaped vessel and show that keel, COB, COG, Metacentre, Metacentric height and Righting level.

Or

(b) Sketch the midship transverse section of a box shaped vessel to show unstable Equilibrium.

19. (a) Sketch the midship transverse section of a beeled ship and Explain free surface effect.

Or

(b) State the formula for calculating Free Surface Correction (FSC) due to multiple slack tanks.

20. (a) M.V Hindship arrives at a port, where the density of water is 1.014 t/m^{-3} at an even keel draft of 6.72 m. She sails at a draft of F 7.2 m, A 7.3 m, 120t of FW was received and 40t of fuel and FW were consumed in port. Calculate the weight of Cargo loaded at that port.

Or

(b) M.V. Hindship floating at a draft of F 5.70 m, A 7.60 m, KG 6.12 m, loads 400 t of Cargo in 3 TD, 2 m off the centre line to port. Calculate her angle of list No. FSC.

———————

C–5831

Sub. Code
11635

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Third Semester

Nautical Science

VOYAGE PLANNING AND COLLISION PREVENTION
(B.A. CHART 813)

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Ocean chart covers over _____.

   (a) Some part of the coast

   (b) Small area of the ocean

   (c) Large portion of the earth

   (d) All of the above

2. Mercator projection uses the parallel of _____ and _____.

   (a) Equator, longtitude

   (b) Latitude, longtitude

   (c) Equator, latitude

   (d) Azimuth, equator

3. Chart datum is also called as _____ datum.

(a) Ordinance (b) Tidal

(c) Horizontal (d) Vertical

4. _____ is an area within defined limits in which one way is established.

(a) Traffic lane

(b) Separation line

(c) Inshore traffic zone

(d) Separation zone

5. Temporary and preliminary notices are issued by _____ officer.

(a) Hygrographic (b) Hydrographic

(c) Cinilgraphic (d) Either (a) or (b)

6. Admiralty tide table is published in the month of _____.

(a) March (b) May

(c) July (d) January

7. _____ refers to around a fixed point on the earth's axis around which the planet spins.

(a) True north (b) Magnetic north

(c) Compass north (d) Geodetic north

8. CADET rule is applied for calculating _____.

(a) Gyro error

(b) Compass error

(c) Both (a) and (b)

(d) Convert true N to compass N vice versa

9. A narrow channel is _____ miles wide.

(a) 4 (b) 2

(c) 5 (d) 3

10. The entire world is divided into _____ time zones.

(a) 24 (b) 12am/12pm

(c) 20 (d) 15

Part B

(5 × 5 = 25)

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

11. (a) Explain plan chart.

Or

(b) Describe a Chart Folio.

12. (a) Explain the importance of chart datum.

Or

(b) What are the uses of Clearing Bearings.

13. (a) Write about Cumulative Notices to Mariners.

Or

(b) How will you record the updates in NP133A.

14. (a) Define true, magnetic and Compass North.

Or

(b) How will you determine vessels position from raising and dipping of lights?

15. (a) Define 'Narrow Channel' and 'Fairway'.

Or

(b) Define 'Traffic lane' and 'Separation line'.

Part C

$(5 \times 8 = 40)$

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

16. (a) How will you recognize the following on chart?

    (i) Chart title

    (ii) Scale of chart

    (iii) Edition number/Date

Or

(b) Describe any four types of charts.

17. (a) Explain leading lights.

Or

(b) How will you identify chart symbols in INT 5011.

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

Or

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

19. (a) Explain sextant angle.

Or

(b) How will you determine the latitude and longitude of any point on the chart by using set squares.

20. (a) Explain Risk of Collision.

Or

(b) Write about rule number 18.

———————

C–5832	Sub. Code 11636

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Third Semester

Nautical Science

CARGO OPERATION – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Section A (10 × 1 = 10)

Answer **all** questions.

1. ———————— is the space available in a ship's compartment when cargo is loaded in packaged form.
   (a) Bale capacity (b) Bulk carrier
   (c) Boxes (d) None
2. ———————— is the volume occupied by grain or any form of bulk cargo inside the cargo hold.
   (a) Bale capacity (b) Grain capacity
   (c) Boxes (d) None
3. ———————— is the maximum amount of weight that can be loaded safely on a unit area.
   (a) Load Density (b) Cargo Density
   (c) Dead Weight (d) None
4. ———————— is defined as mass of a cargo per unit volume.
   (a) Load Density (b) Cargo Density
   (c) Dead weight (d) None

5. Prior handling over ———————— for operation, it need to be thoroughly checked.

(a) Cargo (b) Sling

(c) Cargo Gear (d) None

6. ———————— includes permanent and semi-permanent structures and gear.

(a) Standing Rigging (b) Toppling

(c) Blockings (d) None

7. ———————— results when water droplets are deposited on parts of the ship's structure.

(a) Lashing (b) Chocking

(c) Ship sweat (d) None

8. ———————— results when water droplets are deposited on parts of the cargo.

(a) Lashing (b) Cargo sweat

(c) Ship sweat (d) None

9. How often hatch cover is inspected?

(a) 5 years (b) yearly

(c) 2 years (d) None

10. How weather tightness of hatchcover carried out?

(a) Hose testing (b) Chalk test

(c) u/v test (d) All of above

Section B (5 × 5 = 25)

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

11. (a) Explain the importance of cargo care to Economical operation of ships and on board ships.

Or

(b) Explain stowage and handling to prevent breaking and the importance of structural Integrity.

12. (a) Explain external and internal binding.

Or

(b) Write down the relationship between diameter of sheave and diameter of rope/wire.

13. (a) Explain the manual purpose of Lashing code and cargo securing Manual.

Or

(b) Describe the operational checks to be done on ship's cargo Gear before handing over to stevedores.

14. (a) Describe the maintenance and use of side cleats and cross joint wedge mechanism.

Or

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

15. (a) Explain about the effective communications during loading and discharging.

Or

(b) Write down the precautions to be taken when using forklift bulldozers and grabs and other heavy gear on board.

Section C (5 × 8 = 40)

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

16. (a) Explain the methods of loading by conveyor and discharging by Grab.

Or

(b) Explain stowage factor, Broken stowage, ullage, and load density.

17. (a) Describe in detail the different types of slings.

Or

(b) Explain the parts of a block and the types of blocks.

18. (a) Explain the control of sweat by ventilation and the operation of ventilation system.

Or

(b) Explain static Test and Dynamic Test in testing of cranes.

19. (a) Explain the types of Hatches and its uses.

Or

(b) Explain the procedure for securing hatches in open position to guard against accidental movement.

20. (a) Explain the hazardous nature, special stowage requirement related to cargoes not covered by special codes.

Or

(b) Explain the Inspection of cargo gear prior work and cargo-handling safety and precautions.

———————

C–5833

Sub. Code
11637

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Third Semester

Nautical Science

NAVIGATION WATCH KEEPING & BRIDGE EQUIPMENT – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Sextant is an instrument used to measure _____.
   (a) Nautical miles (b) Angles
   (c) Variation (d) Pressure

2. Error of perpendicularity of sextant can be corrected (Say True/False)

3. Which of the following are included in IBS?
   (a) Passage Execution
   (b) Communications
   (c) Safety and security
   (d) All the above

4. The velocity of sound in water is _____.
   (a) 1400 m/sec (b) 1450 m/sec
   (c) 1500 m/sec (d) 1550 m/sec

5. Which of the following is a part of ships steering control system?

(a) Rudder

(b) Steering gear

(c) Control equipment

(d) all the above

6. Emergency steering is a system that is used during the failure of the ships _____.

(a) main steering system

(b) main engine

(c) auto pilot

(d) all the above

7. As per watch arrangement, the bridge be left unattended at _____.

(a) short break (b) some time

(c) no time (d) long break

8. Error of compass should be checked _____ a watch.

(a) once (b) twice

(c) thrice (d) four times

9. At Anchor, continuous watch is mandatory, (True/False)

10. Which of the following entries must be filled up the Deck officer during his/her watch?

(a) the position of the ship in latitude and longitude at different intervals

(b) time to be noted when Navigation marks are passed

(c) time, details and reason if there is any course alteration

(d) all the above

Part B (5 × 5 = 25)

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

11. (a) Explain Bridge Navigation watch alarm system.

Or

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

12. (a) What are the uses of Global Position Fixing system?

Or

(b) How will you keep the records of different kinds of logs during ocean passages?

13. (a) Explain about Navigational Equipment.

Or

(b) What are the limitations of magnetic compass?

14. (a) What are the difference between ground reference speed and water reference speed?

Or

(b) What are the uses of Rate of Turn Indicator (ROTI)?

15. (a) What are the Physical factors that affect the velocity sound in seawater?

Or

(b) Describe the use and care of the Day light signaling lamp.

Part C

($5 \times 8 = 40$)

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

16. (a) Describe the procedure for handing over and taking over bridge watches.

Or

(b) Describe the principles to be observed while keeping a safe navigational watch and cookout.

17. (a) Explain the importance of recording all relevant information log books.

Or

(b) Explain pilot embarking.

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

Or

(b) Describe the conversion of compass course to true course using deviation card.

19. (a) Explain the inter-switching of Follow up and Non-follow up and Emergency steering system.

Or

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

20. (a) Explain Echo sounder.

Or

(b) Describe the use, care and precautions while operating wipers and clean view screen.

———————

C–5834	Sub. Code 11639

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. When pressure increases the boiling point of water

   (a) increases (b) decreases

   (c) same (d) initially decreases

2. Reverse osmosis uses _____.

   (a) paper (b) filter

   (c) cloth (d) semi permeable membrane

3. What is the atmospheric air pressure?

   (a) 3 bar (b) 1 bar

   (c) 2 bar (d) 4 bar

4. What is the main engine starting air pressure?

   (a) 7 bar (b) 30 bar

   (c) 10 bar (d) 15 bar

5. What is the use of boiler on board ship?

(a) to give compressed air

(b) to produce steam

(c) to burn garbage

(d) to purify HFO

6. What is the function of compressor in refrigeration plant?

(a) to increase the pressure

(b) to decrease the pressure

(c) to cool the refrigerant

(d) to heat the refrigerant

7. Framo Cargo pump is driven by _____.

(a) mechanic (b) electric

(c) hydraulic (d) steam

8. Fire pump is _____.

(a) centrifugal (b) gear

(c) screw (d) diaphragm

9. What is the unit of force?

(a) N/m^2 (b) N

(c) KPA (d) PSI

10. Incinerator is used to _____.

(a) supply air (b) burn the garbage

(c) produce steam (d) purify HFO

Part B (5 × 5 = 25)

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

11. (a) What is Hook's law?

Or

(b) Explain the heat treatment of steels.

12. (a) Describe the maintenance procedure of batteries.

Or

(b) What is the purpose of main switch boards and power distribution boards.

13. (a) List out the functions of various equipment in the engine room?

Or

(b) What are the methods of making water potable?

14. (a) Explain the use of compressed air on board.

Or

(b) Explain the safety features on and around the boiler.

15. (a) Explain the principles of refrigeration.

Or

(b) What is necessity of cooling of hydraulic oil.

Part C (5 × 8 = 40)

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

16. (a) Explain the relation of the strength of materials with marine engineering.

Or

(b) Explain ceramics and their uses.

17. (a) Explain the purpose and operation of purifier drive.

Or

(b) Explain the working principles of step up transformers.

18. (a) Explain the classification of ship as per propulsion plant.

Or

(b) Describe a domestic fresh water system.

19. (a) Describe the air bottle and mountings.

Or

(b) Explain smoke tube boiler.

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

Or

(b) Explain the types of steering gear.

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C–5835	Sub. Code 116311

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Third Semester

Nautical Science

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. _____ refers to computer systems capable of performing complex tasks that only a human can do

   (a) ML (b) Data sciences

   (c) AI (d) None

2. _____ refers to AI which can reproduce everything a human can do

   (a) Human level AI (b) AI

   (c) ML (d) None

3. _____ are usually intended to complement, not replace, human experts

   (a) Expert system (b) AI

   (c) ML (d) None

4. Expert systems in AI work on limited knowledge and rules and hence lock _____

(a) Knowledge (b) Intelligence

(c) Common sense (d) None

5. The current state of research in AI is described and present in _____

(a) Lloyd's register (b) AI

(c) ML (d) None

6. _____ models are trained with labeled data sets

(a) Unsupervised ML (b) Supervised ML

(c) ML data (d) None

7. There are _____ types of machine learning

(a) Three (b) Four

(c) Five (d) None

8. The father of AI is _____

(a) John McCarthy (b) John Kennedy

(c) Joseph McCarthy (d) None

9. _____ is a type of machine learning model

(a) AI (b) ML

(c) Neural networks (d) None

10. _____ make accurate decisions with a high degree of autonomy and previous errors

(a) Neural network (b) AI

(c) ML (d) None

Part B (5 × 5 = 25)

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

11. (a) Describe Artificial intelligence.

Or

(b) Differentiate between AI and ML.

12. (a) Explain the capabilities of expert system.

Or

(b) Explain and analyze user interface.

13. (a) Explain the research areas of AI.

Or

(b) Differentiate between ML and DL.

14. (a) Differentiate between supervised learning and unsupervised learning.

Or

(b) Explain and analyze the learning by experience.

15. (a) Explain about AI training.

Or

(b) Explain Neural networks.

Part C (5 × 8 = 40)

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

16. (a) Explain and describe the philosophy and goals of AI.

Or

(b) Explain the applications of AI.

17. (a) Explain the components of expert system.

Or

(b) Explain the applications of expert system in marine field.

18. (a) Explain the applications of machine learning.

Or

(b) Explain in detail neural networks.

19. (a) Explain the various rules of learning and explain supervised, unsupervised and competitive learning.

Or

(b) Explain the working of artificial neural network.

20. (a) Explain the applications of neural network.

Or

(b) Explain the challenges of machine learning in autonomous ships.

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C–5836

Sub. Code
11643

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fourth Semester

Nautical Science

NAVIGATION – III

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. _____ is the interval in time between two successive meridian passage of true sun across the same meridian.

   (a) Solar day (b) Mean solar day

   (c) Sidereal day (d) Apparent solar day

2. The difference between the mean and apparent time measured from the same meridian at any instant is known as _____.

   (a) LHA (b) LAT

   (c) SHA (d) Equation of Time

3. _____ is an arc of the observers rational horizon at his zenith between prime vertical and the vertical circle passing through the celestial body when the body is on the rational horizon.

   (a) Altitude (b) Azimuth

   (c) Amplitude (d) Meridian

4. _____ is the arc of the vertical circle through the body contained between the rational horizon and the centre of the body.

(a) Pressure altitude (b) True altitude

(c) Absolute altitude (d) Indicated altitude

5. PZX triangle is formed by the intersection of how many great circles?

(a) 4 (b) 5

(c) 6 (d) 3

6. Rational horizon is a _____ on the celestial sphere the pole of which is the observers zenith.

(a) Great circle (b) Azimuth

(c) Meridian (d) Zenith

7. How many stages of Twilight are there?

(a) 4 (b) 5

(c) 6 (d) 3

8. For continuous daylight the observers latitude and suns declination should be of different name and limiting latitudes are lat + dec >/ = 90°. (True or False)

9. In right angle triangle one angle is always _____.

(a) 75° (b) 45°

(c) 90° (d) 30°

10. The formula for calculating Zenith distance is _____.

(a) 90° – Azimuth (b) 90° – Altitude

(c) 45° – Azimuth (d) 180° – Altitude

Part B (5 × 5 = 25)

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

11. (a) Describe the equation of time.

Or

(b) Define zone time, Standard Time and International Date Line.

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

Or

(b) Find the maximum azimuth of a star of declination 66°47's for an observer in latitude 43°39's.

13. (a) Explain constellations.

Or

(b) Explain the corrections a_1, + a_2 from polestar tables.

14. (a) Explain Geographical position.

Or

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

15. (a) If the sun's declination is 15°S in what latitudes will there be

(i) Twilight all night

(ii) Continuous night

Or

(b) Explain circumpolar bodies.

Part C (5 × 8 = 40)

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

16. (a) Describe the Apparent solar day.

Or

(b) Explain how to alter the ships time during a passage with increasing or decreasing longtitude.

17. (a) How will you calculate sunrise and sunset time using Nautical Almanac.

Or

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

18. (a) Describe the relationship between the altitude of the polaris and the Observer's latitude.

Or

(b) How will you find the true azimuth of the polaris from tables and the direction of position line.

19. (a) Determine the direction of position line through an observer and a position through which if passes.

Or

(b) Explain position fixing by long by Chron and Intercept.

20. (a) Explain the conditions necessary for twilight all night.

Or

(b) Define a circumpolar body and explain at what conditions a body will be at circumpolar.

———————

C–5837

Sub. Code
11644

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. When a ship goes from SW to FW her underwater _____?

   (a) Slings

   (b) Trim

   (c) Volume increases

   (d) None of above

2. The angle of heel at which the vessel would then be in neutral equilibrium is called _____

   (a) Angle of roll

   (b) Vertical angle

   (c) Horizontal angle

   (d) None

3. Righting Moment (or) ————————

(a) Statical stability

(b) Righting statical stability

(c) Moment of statical stability

(d) None of above

4. When a vessel is heeled if she tends to continue heeling further she is said to be in _____

(a) Stable equilibrium

(b) Ustable equilibrium

(c) Neutral equilibrium

(d) None of above

5. Find the GM of a box shaped vessel 20×6×5m if draft = 3m and KG=1.8 m

(a) 0.5 m (b) 0.6 m

(c) 0.7 m (d) 0.8 m

6. _____ of a substance is the number of times the substance is heavier than freshwater.

(a) relative density (b) density

(c) volume (d) none of above

7. Thrust = _____

(a) Area/pressure (b) Pressure/area

(c) Pressure × Area (d) None of above

8. What is the unit of relative density?

(a) Nm^{-2} (b) Nm^{-3}

(c) Nm^{-1} (d) No units

9. FWA = _____

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

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

10. If the draft aft is greater than the draft food, the ship is said to be _____

(a) trimmed

(b) trimmed by the stern

(c) trimmed by the vessel

(d) none of above

Part B (5 × 5 = 25)

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

11. (a) Explain the change of trimming moment.

Or

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

12. (a) Explain Range of stability.

Or

(b) Explain kN cross curves of stability.

13. (a) Explain Simpson's second and third rule.

Or

(b) Explain angle of repose and volumetric heeling moment.

14. (a) Explain the Remedial Actions for angle of loll giving reasons for the ballasting sequence to rectify same.

Or

(b) Derive the formula for calculating BM (transverse)

15. (a) M.V. Hind ship at a draft of F 7.68 m, A 7.82 m, loads 220 t in No.2 TD and consumes 30 t of TW from the TD Drinking water tank (P). Calculate the final drafts F and A.

Or

(b) M.V. Hindship, displacing 7720 tonnes KG 8.42m, no FSC, loads 330 tonnes, kg 10.52 m and cg 2m off the centre line to starboard. Calculate the resultant list.

Part C

(5 × 8 = 40)

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

16. (a) Explain the theory of trim and trim due to loading, discharging and shifting weights.

Or

(b) Calculate the location of COG, COB and COF.

17. (a) Sketch showing how the GZ curve for vessel with OGM is affected by a reduction in the vessel's KG.

Or

(b) Obtain dynamic stability by computing area under the GZ curve upto given angle using Simpson's rules.

18. (a) Use wall sided formula to obtain GZ value at moderate and large angle of heel.

Or

(b) Determine by stability calculations whether the ship satisfies the requirements of stability criteria as specified in SOLAS 74.

19. (a) Derive the formula for calculating TWA.

Or

(b) Derive Atwood's formula for calculating GZ at moderate or large angles of heel.

20. (a) M.V. Hindship is floating at a draft of F 5.62m, A 6.78m, A wt of 220 tonnes is then shifted from No.3 TD to a position 112.5 metres ford of AP. Calculate the final drafts F and A.

Or

(b) M.V. Hindship floating in water RD 1.025 at a draft of F 7.23m, A 7.93 m, loads 940 t and sails to another part consuming 130t of fuel and TW. Find her arrival hydrostatic draft at the second port in water RD 1.009.

———————

C–5838

Sub. Code
11645

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. Hospital clean and shovel clean are grades of _____.

   (a) Ship cleaning (b) Hold cleaning

   (c) Vessel cleaning (d) None of above

2. The end of the _____ must be confirmed as clear, with no debris fouling the end of the suction pipe.

   (a) bilge line (b) bilge suction line

   (c) neutral line (d) none of above

3. Chain lashings, wire lashings and _____ are effective means of securing deck cargo.

   (a) fabricated weblashing

   (b) bilgeline

   (c) hold cleaning

   (d) none of above

4. The height of the timber deck cargo shall be such that adequate visibility is assured from the _____.

(a) Bridge (b) Navigating bridge

(c) Vessel (d) None of above

5. All _____ including all parts and gears whether fixed or moveable shall be tested and examined by a _____.

(a) Equipments, officer

(b) Equipments, competent person

(c) Lifting appliances, competent person

(d) None of above

6. Initial and periodical test and examination entries are made in _____.

(a) Chain Register (b) Lloyd's Register

(c) Stock Register (d) None of above

7. _____ consists of cargoes which possess a chemical hazard which may give rise to a dangerous situation on a ship.

(a) Group A cargoes (b) Group B cargoes

(c) Grain code (d) None of above

8. _____ of cargoes which may liquify if shipped.

(a) Group A cargoes (b) Group B cargoes

(c) Vessel (d) None of above

9. _____ and _____ are the main hazards of grain cargoes.

(a) Settling and lifting

(b) Shifting and lifting

(c) Settling and shifting

(d) None of above

10. _____ includes wheat, maize, oats, rice, pulses, seeds and their processed forms.

(a) Grains (b) Cargoes

(c) Cereals (d) None of above

Part B (5 × 5 = 25)

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

11. (a) Discuss the maintenance of cargo gear Markings of ship's lifting appliances.

Or

(b) Explain the importance of checking and method of checking bilge suction.

12. (a) Explain (i) Angle of repose (ii) Moisture Migration, (iii) Trimming.

Or

(b) Discuss the protection of deck machinery from dust.

13. (a) Describe the methods of reduce heeling moments in order to meet Grain stability criteria.

Or

(b) Write the Grain loading stability criteria for ships with and without a DoA.

14. (a) Explain the need for regular inspection of lashing arrangements.

Or

(b) Explain the need for provision of walkaways and access to the top of the cargo.

15. (a) Explain primary and secondary hazard class.

Or

(b) Explain the limitations on carriage of explosives.

Part C (5 × 8 = 40)

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

16. (a) Explain the duties and powers of the Dock safety Inspector and explain authorized and responsible person.

Or

(b) Explain the different types of Deck cargoes.

17. (a) Explain (i) uses of Loadicator for stowage plan, (ii) Trimming of Bulk cargo, (iii) Draft survey.

Or

(b) Explain BLU code : purpose and objectives of Bulk Carrier loading and unloading.

18. (a) Explain (i) Filled and partly filled compartments (ii) Trimmed and untrimmed cargo.

Or

(b) Describe the common damage/defects that may occur on watertight transverse bulkheads.

19. (a) Explain in detail (i) stowage and securing of deck timber cargoes, (ii) Hazards involved in deck timber cargo.

Or

(b) Explain the Rolling period test for determining ship's stability and its limitations.

20. (a) Explain the (i) inspections before loading dangerous goods (ii) construction of magazine for carriage of explosives.

Or

(b) Explain the classification, structure and uses of IMDG code.

———————

C–5839

Sub. Code
11647

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fourth Semester

Nautical Science

MARINE ENGINEERING, AUTOMATION AND CONTROL SYSTEMS – II

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. ———————— is used to lift and lower the anchor of the ship.

   (a) Propeller (b) Windlass

   (c) Rudder (d) None of above

2. ———————— is burning substance which can burn and produce energy for use.

   (a) Fuel (b) Air

   (c) Wind (d) None of above

3. ———————— is the process of supplying more air to the engine cylinder so that more fuel can be burnt to give more power.

   (a) Turbocharging (b) Supercharging

   (c) Lubricating (d) None of above

4. The function of ———————— is to reduce friction and to protect from crossion.

(a) Lubrication (b) Propeller

(c) Windlass (d) None of above

5. ———————— is used to separate the oil from bilge water before pumping it to overboard.

(a) Separator

(b) Water separator

(c) Only water separator

(d) None of above

6. ———————— is used to calculate the power output of the engine.

(a) Bar Diagram (b) Indicator diagram

(c) Alarm (d) None of above

7. ———————— is driven electrically or hydraulically.

(a) Bow thruster (b) Windlass

(c) Propeller (d) None of above

8. UTI meter is ————————.

(a) Ullage Time Interface

(b) Ullage Temperature Interface

(c) Ullage Temperature Indicator

(d) None of above

9. ———————— is used to measure the hydrocarbon gas level in the cargo tank of oil tankers before man enters.

(a) Bow thruster (b) Ullage

(c) Explosimeter (d) None of above

10. ———————— is cutting the supply of oxygen or air from air.

(a) smothering (b) charging

(c) lubricating (d) none of above

Part B (5 × 5 = 25)

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

11. (a) Describe the properties of different types of fuels used on board ship.

Or

(b) Describe the components of Diesel engine.

12. (a) Describe jacket water cooling system of main engine.

Or

(b) Describe the purpose of turbocharger and procedures of Turbo charger washing.

13. (a) Explain FSS code requirement for inert gas system.

Or

(b) Explain with diagram electric steering.

14. (a) Explain with diagram the working of a cock.

Or

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

15. (a) Explain periodic checks carried out in UMS.

Or

(b) Explain the need of clean and alternate fuel.

Part C (5 × 8 = 40)

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

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

Or

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

17. (a) Explain with sketch a proportional controller.

Or

(b) Explain hydraulic and electrical control system.

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

Or

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

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

Or

(b) Explain with diagram a typical bilge and ballast system for a dry cargo ship.

20. (a) Explain with diagram a vapour compression system.

Or

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

C–5840	Sub. Code 11648

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.

Fourth Semester

Nautical Science

METEOROLOGY

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Coriolis force is ———— at the poles

   (a) minimum (b) maximum

   (c) zero (d) either (a) or (b)

2. If the distance between consecutive isobars is large then the pressure gradient is ————

   (a) small (b) high

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

3. Air masses are classified into how many ways?

   (a) 3 (b) 2

   (c) 1 (d) 4

4. The boundary between two air masses is known as ————

   (a) front (b) cyclone

   (c) ridge (d) trough

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

(a) hot (b) warm

(c) cold (d) dry

6. Selected ship is equipped with a limited number of certified meteorological instruments for making observations (True or False)

7. The relative density of iceberg is about ————————

(a) 1 m (b) 0.9 m

(c) 0.5 m (d) 0.8 m

8. Each single piece of floating sea-ice is known as ————

(a) front (b) cyclone

(c) floe (d) ridge

9. Which instrument is used to measure the humidity?

(a) Barograph (b) Hygrometer

(c) Barometer (d) Anemometer

10. Anemometer is used to measure ————————

(a) wind speed (b) density

(c) humidity (d) air pressure

Part B (5 × 5 = 25)

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

11. (a) Describe the properties of water vapour in the atmosphere.

Or

(b) State the effect of pollution on the formation of radiation fog.

12. (a) Describe the services provided for shipping by meteorological offices.

Or

(b) Explain the need for meteorological codes.

13. (a) Compare TRS and a temperature latitude depression.

Or

(b) Draw a synoptic pattern for a ridge.

14. (a) What are the characteristics of ocean current?

Or

(b) Explain the difference between waves and swell.

15. (a) Write the use and operation of Stevenson's screen.

Or

(b) What is the use of barograph and anemometer?

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

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

16. (a) Explain the formation of radiation fog, mentioning areas, seasons and reasons for its dispersal.

Or

(b) Explain wind and pressure system over the oceans.

17. (a) Explain about air mass.

Or

(b) Describe world meteorological organization.

18. (a) What are the characteristics of TRS?

Or

(b) Draw a synoptic pattern of an anticyclone for both northern and southern hemisphere.

19. (a) Explain about tides.

Or

(b) What are the different types of ice on the sea?

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

Or

(b) What is the necessity of ship borne meteorological instrument?

———————

C–5843

Sub. Code
11651

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fifth Semester

Nautical Science

NAVIGATION AND COLLISION PREVENTION REGULATIONS
(BA chart 5049/5047/5048/2675)

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. _____ refers to the direction a current is flowing.

   (a) Set (b) Rate
   (c) Drift (d) Leeway

2. Leeway is the distance a ship is pushed off course by _____.

   (a) waves (b) wind
   (c) current (d) pressure

3. Flood tide is the incoming or rising tide when the water level is decreasing. (Say True/False)

4. Tidal range is _____ of water level between high tide and low tide.

   (a) difference (b) sum
   (c) product (d) maximum

5. There are _____ region in buoyage system.

(a) 2 (b) 3

(c) 1 (d) 4

6. What is the colour of lateral mark in region A?

(a) Green (b) Red

(c) White (d) Blue

7. What is the first stage in passage planning?

(a) Execution (b) Appraisal

(c) Planning (d) Monitoring

8. How many stages are there in passage planning?

(a) 3 (b) 4

(c) 2 (d) 5

9. What is the arc of visibility of Masthead light?

(a) 125 (b) 225

(c) 325 (d) 425

10. Vessels shall be deemed to be in sight of one another only when one can be observed visually from the other. (Say True or False)

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

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

11. (a) Define :

(i) Set

(ii) Rate

(iii) Leeway.

Or

(b) What is the theory of position lines of 'Long by Chron'?

12. (a) Define :

(i) Chart datum

(ii) Range of tide.

Or

(b) Describe the cause and effect of Neap tide.

13. (a) What are the different types of buoys in IALA system?

Or

(b) Explain virtual buoys.

14. (a) List out the sources of appraisel in passage planning.

Or

(b) How will you check the proper functioning of navigational instruments?

15. (a) Define :

(i) Masthead light

(ii) Sternlight.

Or

(b) Explain short and prolonged blast.

Part C (5 × 8 = 40)

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

16. (a) How will you calculate course and distance made good with a tidal stream?

Or

(b) How will you plot the Astronomical Position Lines?

17. (a) How will you calculate the intermediate heights of water for standard ports?

Or

(b) How will you predict tidal current direction rate from the information available on the chart?

18. (a) Explain International Association of Lighthouse Authorities Buoyage system 'A'.

Or

(b) Explain Isolated Danger Buoys.

19. (a) Explain execution in passage planning.

Or

(b) How will you prepare a voyage plan sheet?

20. (a) How will you recognize lights and shapes carried by vessels when underway?

Or

(b) Describe the sound signals to be used by vessels when in sight of one another.

———————

C–5844	Sub. Code 11652

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.

Fifth Semester

Nautical Science

NAVAL ARCHITECTURE – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Simpson's rule is used to calculate area of _____.

   (a) Circle

   (b) Curved surface

   (c) Rectangle

   (d) Square

2. Centre of pressure is a point through which _____ is considered to act.

   (a) force (b) density

   (c) thrust (d) energy

3. Entry of water into a compartment below the water line is called bilging. (True/False)

4. Bilging causes loss of _____.

   (a) Buoyancy (b) Pressure

   (c) Area (d) Energy

5. _____ causes a ship's hull to bend upwards in the middle.

(a) Hogging (b) Sagging

(c) Slamming (d) Bilging

6. _____ occurs on a ship when the bow lifts out of the water and then slam backs down.

(a) Sagging (b) Pounding

(c) Slamming (d) Bilging

7. _____ ship is used to transport temperature controlled goods.

(a) Ro Ro (b) Refrigerated

(c) Timber (d) All the above

8. Which of the following is a ship designing stage?

(a) Concept (b) Preliminary

(c) Contract (d) All the above

9. Sea trial is the process of checking _____ of ship.

(a) Parameters (b) Fuel consumption

(c) Safety (d) All the above

10. Outfitting comes after launching and before sea trail. (True/False)

Part B (5 × 5 = 25)

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

11. (a) Explain second moment of area.

Or

(b) What are the marine applications of Simpson's rule?

12. (a) What are the effects of bilging of a compartment without permeability?

Or

(b) What are the actions to be taken in the event of partial loss of intact buoyancy?

13. (a) What is the difference between hogging and sagging?

Or

(b) What is meant by pounding and slamming?

14. (a) Describe any two stages of ship design.

Or

(b) Explain chemical tankers.

15. (a) Explain the lofting and fairing in ship building process.

Or

(b) List out the shipyard process.

Part C (5 × 8 = 40)

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

16. (a) Sketch and describe theorem of parallel axes.

Or

(b) Compute centre of pressure for combination of regular shapes.

17. (a) Sketch and describe bilging of a box shaped vessel.

Or

(b) How will you calculate flooding of a midship compartment for a box shaped vessel?

18. (a) Explain stresses experienced by ships in still water and in seaway.

Or

(b) Describe racking stress and its causes.

19. (a) Explain the principles of ship design.

Or

(b) Explain Refrigerated cargo ship.

20. (a) Describe any four ship building practices.

Or

(b) Explain any four shipyard process.

———————

C–5845

Sub. Code
11653

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fifth Semester

Nautical Science

SHIP SAFETY EQUIPMENT

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Section A (10 × 1 = 10)

Answer **all** questions.

1. Engine, General Alarm, lifeboat moved from stowed position need to be carried out _____.

   (a) Weekly (b) Monthly

   (c) Yearly (d) None

2. Freefall lifeboat is required for which ship?

   (a) Container (b) Car Carrier

   (c) Bulk Carrier (d) None

3. How many child life jacket should be there on board?

   (a) 9 percent of capacity

   (b) 10 percent of capacity

   (c) 11 percent of capacity

   (d) None

4. What is the duration of MOB smoke market?

(a) 15 Mins (b) 20 Mins

(c) 25 Mins (d) None

5. Class B fire is fire involving _____.

(a) Gas (b) Solid

(c) Liquid (d) None

6. What is fire tetrahedron?

(a) 2 sides of fire (b) 4 sides of fire

(c) 3 sides of fire (d) None

7. To which class of fire, water type extinguisher is used?

(a) Class C (b) Class B

(c) Class A (d) None

8. To which class of fire, foam type extinguisher is used?

(a) Class A (b) Class B

(c) Class C (d) None

9. What is the duration of safety lamp in fireman's outfit?

(a) 3 hrs (b) 4 hrs

(c) 2 hrs (d) None

10. What is the frequency of fire drill on ships?

(a) Monthly (b) Weekly

(c) Yearly (d) None

Section B (5 × 5 = 25)

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

11. (a) Explain the communication equipment on life boats.

Or

(b) Describe line throwing appliance, use, care and maintenance.

12. (a) Explain the objectives of fire safety and functional requirements.

Or

(b) Explain the control of class B fires.

13. (a) Explain the uses and Need of ventilators.

Or

(b) Describe the uses of IQ system for fire prevention in tankers.

14. (a) Explain the purpose and functional requirement of safety systems.

Or

(b) Describe the operational limit for Alarm systems.

15. (a) Describe steam smothering system.

Or

(b) Describe the fire safety precautions on Cargo ships and tankers during working.

Section C (5 × 8 = 40)

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

16. (a) Explain the classification of ship for Life Saving Appliances.

Or

(b) Describe and explain the different types of Life boats.

17. (a) Describe the theory and chemistry of fire.

Or

(b) Explain the fire safety plan and Training Manual.

18. (a) Describe Class A, B and C class divisions.

Or

(b) Explain the construction of means of Escape, stairway and fire doors.

19. (a) Describe the fixed fire detection and alarm system.

Or

(b) Explain the periodic testing of sensors and detection system.

20. (a) Explain the Fire Organization on ships.

Or

(b) Explain the firefighting actions for fires in Machinery spaces and Boiler Rooms and describe the procedure of fire fighting in port.

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C–5846

Sub. Code
11654

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fifth Semester

Nautical Science

NAVIGATION WATCH KEEPING AND BRIDGE EQUIPMENT – II

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Section A (10 × 1 = 10)

Answer **all** questions.

1. Standard compass error refers to the difference between the reading on ship's primary magnetic compass and true ———————— direction.

   (a) North (b) South

   (c) East (d) West

2. Which of the following is to be monitored for safe navigation?

   (a) Speed (b) Course

   (c) Position (d) All the above

3. International Ice Patrol was established in ————————

   (a) 1915 (b) 1914

   (c) 1913 (d) 1916

4. Safe watch keeping on a ship involves being aware of the situation, regularly checking equipment (Say True of Talse)

5. Which of the following is the characteristic of Radar?

(a) VBW (b) HBW

(c) Pulse length (d) All the above

6. ARPA stands for ————————

(a) Automatic Radar Plotting Aid

(b) Advance Radar plotting Aid

(c) Automatic Radar Precision Aid

(d) Advance Radar Precision Aid

7. Drift of gyro compass is the movement of the spin axis in the direction of ————————.

(a) Longitude (b) Latitude

(c) Azimuth (d) Equator

8. Magnetic ———————— is the tendency of the compass needles to point down as well as to the magnetic pole.

(a) drift (b) dip

(c) tilt (d) either (a) or (b)

9. Log book entries should be made before leaving bridge (Say True or False)

10. VDR stands for ————————.

(a) Vessel Data Recorder

(b) Voyage Data Recorder

(c) Voyage Date Recorder

(d) Vessel Date Recorder

Section B (5 × 5 = 25)

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

11. (a) What are the principles observed in keeping safe navigation watch?

Or

(b) Compare standard and gyro compasses.

12. (a) Explain watch keeping in clear weather.

Or

(b) Describe Ice navigation.

13. (a) Describe maximum and minimum range of radar and bearing discrimination.

Or

(b) Explain Radar overlay on ECDIS.

14. (a) Explain gyroscopic inertia and precession.

Or

(b) How liquid compasses are to be maintained.

15. (a) Explain Radio Positioning Integrated by Satellite.

Or

(b) What is the purpose of LRIT.

Section C (5 × 8 = 40)

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

16. (a) Explain COLREGS72.

Or

(b) Describe manual testing of automatic pilot functioning of navigation.

17. (a) Describe the principles involved in safe watching.

Or

(b) What are the preparation to be done for proceeding to sea?

18. (a) What are the characteristics of radar sets.

Or

(b) Explain Automatic Radar plotting Aid.

19. (a) Describe a free gyroscope and its gimbal mountings.

Or

(b) Explain magnetic compass.

20. (a) Discuss the basic working principle of GPS.

Or

(b) Explain Automatic Identification system.

———————

C–5847

Sub. Code
11657

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fifth Semester

Nautical Science

SPECIALIZED CARGO OPERATION

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. TEU stands for _____

   (a) Twenty Equivalent Units

   (b) Twenty Equal Units

   (c) Twenty Establishment Units

   (d) Twenty Estimated Unit

2. Maximum Gross Weight is the maximum allowable combined weight of the container and its cargo. (Say True/False)

3. Which of the following is not a quality of good refrigerant?

   (a) High thermal dynamic efficiency

   (b) High cost

   (c) Low working pressure

   (d) Low volume

4. Chilled cargoes temperature are maintained from _____

(a) –2°C to 6°C (b) 2°C to 6°C

(c) –6°C to 2°C (d) –6°C to –2°C

5. IGS stands for _____

(a) Inert Gas System

(b) Inert Gear System

(c) Important Gas System

(d) Important Gear System

6. Which of the following is a hazard on Tankers?

(a) Toxicity (b) Flammability

(c) Static (d) All the above

7. _____ ship is designed to carry very large and heavy loads that can't be transported by standard ships.

(a) Heavy lift (b) Ro Ro

(c) Reefer (d) All the above

8. When vessel lifts the heavy lift the COG shifts to _____ of the crane.

(a) Wheel (b) Hook

(c) Head (d) Track

9. Which type of gas tanker is used for transporting liquefied gases?

(a) X (b) Y

(c) Z (d) A

10. Which category of cargo is a major hazard to marine resources?

(a) X (b) Y

(c) Z (d) A

Part B (5 × 5 = 25)

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

11. (a) What are the features of a container?

Or

(b) What are the factors affecting a container stow?

12. (a) Explain the need of pre-cooling of spaces.

Or

(b) What are the purposes of temperature recording?

13. (a) Define :

(i) refined products

(ii) sour crude.

Or

(b) What are the hazards of oil cargoes?

14. (a) What are the elements to be considered for heavy lift operations?

Or

(b) What are the precautions to be taken while discharging heavy lifts?

15. (a) Explain the hazards associated with chemical cargoes.

Or

(b) What is the purpose and objective of IGC code.?

Part C (5 × 8 = 40)

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

16. (a) Describe the parts of containers.

Or

(b) Explain Bay plans.

17. (a) How hold and lockers are prepared for loading refrigerated cargo?

Or

(b) Explain the general outline of refrigeration system.

18. (a) Describe the general arrangement of segregated ballast tanks and slop tanks.

Or

(b) Explain cargo piping system.

19. (a) What are Heavy Lift Operations?

Or

(b) Explain the transportation and planning considerations for Heavy Lift Cargoes.

20. (a) Explain different types of chemical tankers.

Or

(b) What are the hazards of gas cargoes? Explain the control measures adopted.

———————

C–5848	Sub. Code 11658

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025

Fifth Semester

Nautical Science

MARINE ENVIRONMENTAL PROTECTION

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. MARPOL stands for ————————.

   (a) Marine pollution (b) Marine polluted

   (c) Marine oil (d) None

2. MARPOL annex 1 deals with ————————.

   (a) NLS (b) Sewage

   (c) Oil (d) None

3. Oil record book for machinery space is required for other ship of size, ————————.

   (a) 200 GT (b) 300 GT

   (c) 400 GT (d) None

4. Oil record book part 2 is required only for ———————— only.

   (a) Coolers (b) Tankers

   (c) Boilers (d) None

5. Cargo record book is required for ————————.

(a) Tanker (b) Cooler

(c) Chemical Tanker (d) None

6. ———————— of MARPOL deals with substance carried in packaged form.

(a) Annex 1 (b) Annex 2

(c) Annex 3 (d) None

7. Annex 4 of MARPOL deals with ————————.

(a) Oil (b) Sewage

(c) Garbage (d) None

8. Annex 4 is required for vessel ————————,

(a) 400 GT

(b) Engaged in international voyage

(c) Carrying 15 persons

(d) All of above

9. Food waste can be discharged with ———————— miles from shore in special area.

(a) 2-10 miles (b) 3-10 miles

(c) 3-12 miles (d) none

10. SEEMP stands for ————————.

(a) Shipboard Efficient Energy Management Plan

(b) Shipboard Energy Efficient Management Plan

(c) Shipboard Energy Eligible Management Plan

(d) None

Part B (5 × 5 = 25)

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

11. (a) Write down the conditions under which oily mixtures may be discharged into the sea from an oil tanker.

Or

(b) Describe Crude Oil washing operation.

12. (a) State the pumping and piping arrangements after loading.

Or

(b) State the more stringent requirements apply in special areas, prewash and ventilation procedures.

13. (a) Describe that packaging containers and tanks should be adequate to minimize hazard to the marine environment.

Or

(b) Describe the provisions regarding the discharge of sewage into the sea.

14. (a) List the special areas for the purpose of Annex-v.

Or

(b) Explain the disposal criteria for cargo residues.

15. (a) Describe the standards that need to be observed in ballast water exchange.

Or

(b) Explain the oil pollution act and the international treaty.

Part C (5 × 8 = 40)

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

16. (a) Explain brief history of MARPOL convention

Or

(b) Describe the surveys and inspections required under the provisions of MARPOL.

17. (a) Explain the categories of noxious liquid chemicals.

Or

(b) Explain reception facilities and cargo unloading terminal arrangements.

18. (a) Describe the notification procedures for loading / uploading harmful substances as per MARPOL.

Or

(b) Describe the documentation relating to the carriage of harmful substances by sea.

19. (a) Describe the regulations concerning the disposal of other garbage.

Or

(b) Describe EEDI and SEEMP.

20. (a) Explain the safety procedure to be followed during BWM for ship and crew.

Or

(b) Give an overview of NPDES and explain its uses.

C–5862

Sub. Code
11664

B.Sc. DEGREE EXAMINATION, NOVEMBER 2025.

Sixth Semester

Nautical Science

MARITIME LAW

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Which organization is responsible for framing International law?

2. Define Private Law.

3. Is it mandatory to register all Merchant ships? If, it is so specify the Act related to registering of ship.

4. Admiralty courts are responsible for what?

5. Describe note of protest.

6. Define Charter party.

7. After the insurance claim is settled, the wrecks are belonging to whom?

8. State the minimum age limit to become a Seaman.

9. What is role of Director General of Shipping?

10. Define fitness for seafarers.

Part B (5 × 5 = 25)

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

11. (a) Describe the role of MLC in Maritime sector.

Or

(b) Explain section 88 of M.S. Act 1958.

12. (a) Express Public Law with respect to 'Merchant shipping.

Or

(b) Discuss the precautions to be followed while carrying deck live cargoes as per International regulations.

13. (a) Explain the perils of sea for Marine insurance.

Or

(b) Discuss the writs injunction Indian arbitration Act 1966.

14. (a) What is Law of Refuge? Explain in detail.

Or

(b) List down Anti-piracy equipment provided on board ship.

15. (a) What is ISPS Code? State three levels of ISPS Code.

Or

(b) What is Maritime fraud? How will you address to these issues.

Part C

(3 × 10 = 30)

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

16. (a) Explain the General Average of carriage of goods by sea act 1925.

Or

(b) What are P and I clubs made for'? Explain the risks coverages under this club.

17. (a) Write about the precautions to be observed while towing a ship in rough weather.

Or

(b) Whit is PSC? Under what circumstances the ships can be detained at port.

18. (a) Explain the procedure of Engagement of Indian seafarer.

Or

(b) Express the list of documents to be carried by a Master for voyage of foreign going ship.

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C–5864

Sub. Code
11666

B.Sc. DEGREE EXAMINATION, NOVEMBER 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 Soft iron magnetism?

2. Describe coefficient Real 'A'.

3. Define DGPS.

4. Express magnetic variation.

5. What is RACON.

6. What do you mean by GDOP?

7. Define coefficient "D".

8. Enumerate the causes of magnetism in the ship's structure.

9. State the uses of Radar.

10. What is differential GPS?

Part B (5 × 5 = 25)

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

11. (a) State the radar plotting with an aid of neat diagram.

Or

(b) What is induced B (IB).

12. (a) Explain the procedures of switching on/off of a radar as an OOW.

Or

(b) Describe the uses of AIS in collision avoidance.

13. (a) With an aid of neat diagram explain the working principle of SAR-SAT Navigation system.

Or

(b) Describe the working principle of EPIRB.

14. (a) Deviation due to hard iron is 10°E. While heading 87°(C), what will be the deviation on a course 30°(C).

Or

(b) Explain the similarities and differences between GNSS and GPS.

15. (a) What is S-VDR? State the information available in this system in any emergency situation.

Or

(b) How does the data exchange from ship-to-ship data?

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

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

16. (a) Explain the working principle of Magnetic compass with a neat diagram.

Or

(b) 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 :	7°E	4°F	3°W	6°W	1°W	5°F	3°F	2°W	1°W

17. (a) Explain the segments of GPS with simplified block diagram.

Or

(b) How does phasing assist and affect in accuracy to obtain depths at long ranges?

18. (a) With an aid of neat sketch explain the working principle of Echo Sounder.

Or

(b) While steering 044°(T) and 16 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.

———————