C–8187	Sub. Code
	11613

B.Sc. DEGREE EXAMINATION, APRIL 2023

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 $\overline{a} \cdot \overline{b}$ if $\overline{a} = 3\vec{i} + 2\vec{j} - \vec{k}$ and $\vec{b} = \hat{i} + 4\hat{j} + 2\hat{k}$.

2. State the axioms of probability.

3. Define Hyperbola.

4. Find the equation of circle with centre (–2, –4) and radius is 5 units.

5. Define spherical angle.

6. Define Primitive triangle of the polar triangle.

7. If $y = e^{\sinh^2 x}$, find $\frac{dy}{dx}$.

8. Evaluate $\int \frac{\cos x}{a + b\sin x} dx$.

9. Prove that the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & -1 \\ 3 & 1 & 1 \end{bmatrix}$ is singular.

10. The eigen values of the matrix A is 2, 8, 2. Find the eigen values of A^{-1} and A^2.

Part B

$(5 \times 5 = 25)$

Answer **all** questions.

11. (a) Prove that the Vectors $\overline{a} = \hat{i} + 2\hat{j} + \hat{k}$, $\overline{b} = \hat{i} + \hat{j} - 3\hat{k}$ and $\overline{c} = 7\hat{i} - 4\hat{j} + \hat{k}$ are mutually orthogonal.

Or

(b) Explain the concept of R.V.discrete and continuous distribution.

12. (a) Find the axis, vertex, focus, directrix, equation of Latus rectum, length of latus rectum for the parabola $y^2 = 4x$.

Or

(b) Use Simpson's rule to find an approximate value of $\int_0^4 e^x dx$.

13. (a) Write the properties of spherical triangles.

Or

(b) The sides of a spherical triangle ABC are all quadrants and x, y, z are the arcs joining any point within the triangle to the angular points, prove that $\cos^2 x + \cos^2 y + \cos^2 z = 1$.

14. (a) If $x = 3\cos t - 2\cos^3 t$, $y = 3\sin t - 2\sin^3 t$ find $\frac{dy}{dx}$.

Or

(b) Evaluate $\int \frac{x^4}{x^2+1} dx$.

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

Or

(b) Find x, y, z given that

$$2\begin{bmatrix} x^2 \\ -y \\ z \end{bmatrix} + \begin{bmatrix} 0 \\ x \\ -y \end{bmatrix} = \begin{bmatrix} 0 \\ z \\ -5/2 \end{bmatrix}$$

Part C (3 × 10 = 30)

Answer **all** questions.

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) State and prove Baye's theorem.

17. (a) In spherical triangle PQR, $PQ = 52°11'$ $Q = 69°47'$ and $QR = 90°$. Calculate P, R and PR.

Or

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

18. (a) Solve the system of equations $3x + y + z = 2$, $x - 3y + 2z = 1$, $7x - y + 4z = 5$.

Or

(b) Using Cayley-Hamilton theorem, simplify the expression

$$A^8 - A^7 + 5A^6 - A^5 + A^4 - A^3 + 6A^2 + A - 2I$$

if $A = \begin{bmatrix} 1 & 2 & -2 \\ 2 & 5 & -4 \\ 3 & 7 & -5 \end{bmatrix}$.

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C–8188	Sub. Code
	11614

B.Sc. DEGREE EXAMINATION, APRIL 2023.

First Semester

Nautical Science

NAUTICAL PHYSICS AND ELECTRONICS-I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Lami's theorem.

2. State Kepler's Laws.

3. What is Isogonic lines?

4. List out the advantages of Toroid.

5. State stoke's theorem.

6. Define luminuous intensity.

7. Define photoelectric effect.

8. What is the bridge rectifier?

9. What is UHF omni range?

10. What is a semiconductor? Give its uses.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) State and explain Lami's theorem.

Or

(b) What are projectiles and derive the expressions for the path of projectile.

12. (a) Briefly explain about hysteresis and magnetic elements of the earth.

Or

(b) Explain about electrical lightning circuit.

13. (a) Discuss the Bernoulli's equation and its application.

Or

(b) Explain the construction and working of Bourdon Pressure Gauge.

14. (a) Explain about optical pyrometer in detail.

Or

(b) Briefly explain about N-type and P-type semiconductor.

15. (a) Discuss about Tactical Air navigation (TACAN).

Or

(b) Explain in detail about the Zener diode as Voltage regulator.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) State and explain Newton's experimental Law.

Or

(b) Describe an experiment to determine surface tension of a liquid by capillary tube method.

17. (a) Explain full wave rectifier and Half wave rectifier in detail.

Or

(b) Explain the following.

(i) Turbulent flow.

(ii) Streamline flow.

18. (a) Write a short note on elements of RADAR system, RADAR Range and its limitations.

Or

(b) Explain the construction and characteristics of the transistors.

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C–8189	Sub. Code
	11615

B.Sc. DEGREE EXAMINATION, APRIL 2023

First Semester

Nautical Science

NAVAL ARCHITECTURE – I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What is the purpose of steering gear room in ship?

2. List out the different types of ships based on nature of the cargo.

3. Define Length overall.

4. Briefly explain double bottom tanks.

5. What is Pilmsoll line?

6. Write short notes on riveting in ship.

7. Define Reserve Buoyancy.

8. What is centre of gravity of ship?

9. Briefly explain freeboard.

10. Define Metacentric height.

Part B (5 × 5 = 25)

Answer **all** the questions

11. (a) Draw a layout of bottom platform of an Engine room.

Or

(b) Explain the construction of oil tanker.

12. (a) Describe about sheer of deck, Rise of floor and Air Draft.

Or

(b) Enumerate shell plating of a ship in detail.

13. (a) Define Deck line and Fresh water allowance.

Or

(b) Describe about the Gas cutting related to ship construction.

14. (a) A solid block of cast iron has a mass of 500 kg. When it is completely immersed in fresh water the mass appears to be reduced to 430 kg. Calculate the relative density of cast iron.

Or

(b) Write short notes on Tonne per centimetre immersion.

15. (a) A plank 6 m long. 0.3 m wide and 50 mm thick has a mass of 60 kg. Calculate the density of the wood.

Or

(b) A piece of brass (rd 8.4) 0.06 m^3 in volume is suspended in oil of relative density 0.8. Calculate the apparent mass of brass.

Part C (3 × 10 = 30)

Answer **all** the questions.

16. (a) A mass of 6 tonne is moved transversely through a distance of 14 m on a ship of 4300 tonne displacement, when the deflection of an 11 m pendulum is found to be 120 mm. The transverse metacentre is 7.25 m above the keel. Determine the height of the centre of gravity above the keel.

Or

(b) Draw and explain about gas welding in detail.

17. (a) Describe about the Duck keel in detail.

Or

(b) Explain the construction of bulk carrier with a neat diagram.

18. (a) A ship displaces 12 240 m^3 of sea water at a particular draught.

(i) Calculate the displacement of the ship.

(ii) How many tonnes of cargo would have to be discharged for the vessel to float at the same draught in fresh water.

Or

(b) Write short note on Double bottom tank, fore peak tank and aft peak tank.

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C–8190	Sub. Code
	11616

B.Sc. DEGREE EXAMINATION, APRIL 2023.

First Semester

Nautical Science

SHIP OPERATION TECHNOLOGY – I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define the term 'Gas carrier".

2. What do you mean by "Forecastle Deck"?

3. What are the markings of "Life Boat"?

4. What are the uses of five hydrant and fire hose?

5. What do you mean by "Halyards"?

6. What is the meaning of "Marline"?

7. What is the meaning of the form of "Fibre Rope"?

8. Define the term "Keel".

9. What do you mean by "Bulbous Bow"?

10. What is the use of "Shackle"?

Part B (5 × 5 = 25)

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

11. (a) Give the details of duties and trainings of bridge water and port watch.

Or

(b) Write any four types of merchant ships and uses.

12. (a) What are the uses of Life Boat?

Or

(b) What is life Raft? Write the requirement of life raft and location to keep on board ship.

13. (a) Describe the uses of the following

(i) SCBA

(ii) Immersion suit

Or

(b) Describe the various types of fire and write uses of portable fire extinguishers.

14. (a) Describe the different characteristics and types of fibre ropes.

Or

(b) Describe the following with a simple sketch

(i) Stem and Stern

(ii) Amidships

(iii) Bow and Quarter

15. (a) Write a note on the comparison of strength and elasticity of different types of ropes.

Or

(b) What are the emergencies to post extra look out?

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Mention the places to post look out man at security level-2.

Or

(b) Draw a simple sketch of a bulk carrier and mark the names of various part of ship.

17. (a) What are the procedures to remove rust and metal surface painting?

Or

(b) What are the care and maintenance to be taken on LSA equipments on board ship?

18. (a) Describe the following:

(i) Fireman outfit

(ii) TPA

(iii) Rescue boat

(iv) LTA

Or

(b) (i) Describe the damages caused by surging.

(ii) Define the following

(1) Load lines

(2) Log lines

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C–8191	Sub. Code
	11623

B.Sc. DEGREE EXAMINATION, APRIL 2023.

Second Semester

Nautical Science

NAUTICAL MATHEMATICS - II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. How do you find a complex number?

2. What is the complex exponential function?

3. Why numerical differentiation is important?

4. What is meant by Simpson's rule?

5. What is the integral of a vector field?

6. Which type of operation is used in Stokes theorem?

7. How do you know if an equation is exact?

8. How do you solve a reducible to a homogenous differential equation?

9. What is linear equation with constant coefficients. Explain.

10. What is the simple harmonic oscillator differential equation?

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

Answer **all** questions.

11. (a) If $Z = 1 + i$, find the Z^2, Z^3, $1/Z$ and plot these on the Argand's diagram.

Or

(b) Prove that

$$2^6 Sin^7\theta = 35Sin\theta - 21Sin3\theta + 7Sin5\theta - 7\theta$$

12. (a) From the following table, obtain the value of $\frac{d^2y}{dx^2}$ at the point $x = 0.96$

X	0.96	0.98	1.00	1.02	1.04
$F(x)$	0.7825	0.7739	0.7651	0.7563	0.7473

Or

(b) Evaluate, $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule with $h = 0.2$. Hence determine the value of π.

13. (a) Using Green's theorem, Show that

$$\int_C (3x + 4y)dx + (2x - 3y)dy = -8\pi$$

Or

(b) Find the work done by the force

$$\overline{F} = 3(x + yz)\vec{i} + 7xz^2\vec{j} - 5yz^2\vec{k}$$

When it moves a particle from $(0,0,0)to(1,1,1)$ along the curve $x = t^3, y = t^2, z = t$

14. (a) Solve the differential equation

$$(5x^4 + 3x^2y^2 - 2xy^3)dx + (2x^3y - 3x^2y^2 - 5y^4)dy = 0$$

Or

(b) Solve $\frac{dy}{dx} = \frac{y + x - 2}{y - x - 4}$

15. (a) Find the particular integral of

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} = x^2 + 2x + 4$$

Or

(b) Find the particular integral of

$$\frac{d^3y}{dx^3} + 4\frac{dy}{dx} = Sin2x$$

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Prove that $\log\left(\frac{a+ib}{a-ib}\right) = 2i\tan^{-1}\left(\frac{b}{a}\right)$. Hence evaluate $Cos\left[i\log\left(\frac{a+ib}{a-ib}\right)\right]$

Or

(b) Given that

X	4.0	4.2	4.4	4.6
Log X	1.3863	1.4351	1.4816	1.5261
X	4.8	5.0	5.2	
Log X	1.5686	1.6094	1.6484	

Evaluate $\int_4^{5.2} \log x\, dx$ by

(i) Trapezoidal Value (ii) Simpson's 1/3 rule (iii) Weddle's rule.

17. (a) Evaluate the line integral $\int_C \overline{F}\, d\overline{r}$, where $\overline{F} = yz\vec{i} + zx\vec{j} - xy\vec{k}$ and C is the arc having end points $O(0,0,0)$ and $P(2,4,8)$ as defined below.

Or

(b) Verify Stoke's theorem for $\overline{F} = \left(x^2 + y^2\right)\bar{i} - 2xy\bar{j}$ taken round the rectangle bounded by the lines $x = \pm a, y = 0, y = b$.

18. (a) Solve $y'' + y = Sec\, x$

Or

(b) A Spring Fixed at the upper end supports a weight of 980 gm. At its lower end. The spring stretches 1/2 cm under a load of 10gm. and the resistance (in gm. wt.) to the motion of the weight is numerically equal to 1/10 of the speed of the weight in cm/sec. The weight is pulled down 1/4 cm below its equilibrium position and then released. Find the expression for the distance of weight from its equilibrium position at time t during its first upward motion. Also find the time it takes the damping factor to drop to 1/10 of its initial value.

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C–8192	Sub. Code
	11624

B.Sc. DEGREE EXAMINATION, APRIL 2023

Second Semester

Nautical Science

NAUTICAL PHYSICS AND ELECTRONICS – II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is oil splashing?

2. Write down the safety precautions in nuclear reactor.

3. Define Skip Zone.

4. Define Critical frequency.

5. Give the truth table for AND and OR Gate.

6. What are logic gates?

7. Define Power gain.

8. Give the important terms of switching circuits.

9. What is transmitter?

10. Define Selectivity and Sensitivity.

Part B (5 × 5 = 25)

Answer **all** questions

11. (a) Describe about oil mixing with water.

Or

(b) Explain charging of oil in pipeline flow with its remedies.

12. (a) Give the theory of electrical resonance in series LCR Circuits.

Or

(b) Define critical frequency and radiation pattern of Hertz Antenna.

13. (a) Explain JK flip flop with suitable diagrams and their truth table.

Or

(b) Explain construction and working of NAND Gate with neat diagram.

14. (a) Write short notes on AM and FM.

Or

(b) Explain transistor as a amplifier in CE mode.

15. (a) Explain the characteristics of radio receivers.

Or

(b) Explain the transmitter and its functions with diagram.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Discuss about the radiation pattern of Hertz and Marconi antenna with neat diagram.

Or

(b) Describe the construction and working of Nuclear reactor.

17. (a) NAND and NOR gates are universal Gates. Explain with diagram.

Or

(b) Discuss in detail about the common base connection with its characteristics.

18. (a) Describe briefly about the Principle and working of Super heterodyne receiver with neat sketch.

Or

(b) Explain in detail about Modulation techniques with its advantages and disadvantages.

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C–8193	Sub. Code
	11625

B.Sc. DEGREE EXAMINATION, APRIL 2023

Second Semester

Nautical Science

SHIP OPERATION TECHNOLOGY – II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the purpose of reading accurate draught of the ship?

2. Explain the term "Shackle" of an Anchor.

3. What are the different mooring patterns used in shipping?

4. Name some PPE[s] used on board.

5. Write a short notes on MOB marker and its use.

6. How squat effect make impact on vessel's speed?

7. What do you understand by the term SCBA?

8. What are the different types of fire extinguishers?

9. Explain the term tactical diameter of a vessel.

10. Precautions to be taken while making fast the tug?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What are the safety precautions you take before preparing for working Aloft?

Or

(b) What are the different types of launching a life raft?

12. (a) Discuss about rigging and maintenance of pilot ladder.

Or

(b) Briefly discuss about "Abandon Ship" drills on board.

13. (a) Explain fixed fire fighting system installed on board.

Or

(b) How do you go about extinguishing a fire? Give details on classifications of fires.

14. (a) What is the purpose of sprinkler system? How it is operating in specific areas?

Or

(b) How care and maintenance on the Anchor and its cable? Also explain the marking on the cable.

15. (a) What are the safety precautions to be taken prior to entry into enclosed space?

Or

(b) Discuss different types of ropes used in mooring operations.

Part C

$(3 \times 10 = 30)$

Answer **all** the questions.

16. (a) How will you keep Anchor watch? What all the checks your do while keeping Anchor watch?

Or

(b) Sketch the Anchor and cable. Describe parts of an Anchor.

17. (a) Explain few important bridge Navigational equipments and their uses.

Or

(b) Describe LSA equipments available on board a ship and its operations.

18. (a) Explain the effects of current against the vessel.

Or

(b) Discuss on different types of Alarms available on board a vessel and their purposes.

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C–8194	Sub. Code
	11626

B.Sc. DEGREE EXAMINATION, APRIL 2023

Second Semester

Nautical Science

NAVIGATION — I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Why variation at a place is not constant?

2. Define statute mile and geographical mile.

3. Define equator and D'long.

4. Define natural scale of a chart.

5. Explain DR position.

6. Enumerate advantages of mercator chart.

7. Find length of 1° of longitude if 1° of latitude on a mercator chart measures 12 cm at latitude 40° N.

8. What is the use of azimuth mirror?

9. Define vertical sextant angle.

10. Explain dip of attitude measurement.

Part B (5 × 5 = 25)

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

11. (a) Explain deviation and variation.

Or

(b) Enumerate non adjustable errors of a sextant.

12. (a) What is parallax in attitude and define horizontal parallax of a body?

Or

(b) Derive proof of parallel sailing formula Dep/D'long = cos (LAT)?

13. (a) If LMT is 22^{D} 02^{H} 47^{m} H^{s} at position 12° 30 'N, 094° 18'W. Find GMT.

Or

(b) On 12^{th} September at about 2100 hours at ship (Time difference of + 05 hrs). Find the chronometer error if it was 07^{m} 05^{s} slow on 10^{th} September at 0600 UTC and daily rate was 06^{s} sec gaining?

14. (a) Find rhumb line course and distance from 28° 20's 048° 38'w to 14° 50'N 017°21' W?

Or

(b) How will you transfer GC track from a gnomonic chart to a mercator chart?

15. (a) Find M'LAT and DMP using traverse tables

(i) LAT A 24° 38' N, LAT B 10° 12'S

(ii) LAT P 37° 48' S, LAT Q 20° 18'N.

Or

(b) Explain with diagram the working principle of a sextant.

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

Answer **all** questions.

16. (a) Find the course and distance from 12° 14' N 073° 12' E to 23° 37' S 010° 19' E? How much time is required to arrive at destination if ships speed is 12 knots?

Or

(b) Enumerate different types of sailing methods used in navigation and write short notes on them.

17. (a) A vessel in Lat 47°S, long 054° W steers a compass course of 265° (c) deviation 15E, variation 10 w for a distance of 4/2 miles. Find position arrived?

Or

(b) Enumerate different types of map or chart projections and write short notes on them.

18. (a) At noon on 20th July a ship was in position 32° 43.8' N, 017° 26.8 W streaming 219° (C), Dev 3°E, Var 18°W. It maintained this course at a speed of 15 Knots till noon the next day. Clocks were retarded 20 minutes at each of three watches-2200, 0200, 0500 hours. Find DR position of ship at noon on 21st July. If the ships fix at noon of 21st July was 27° 24.3' N, 020° 01.0'w find the set and draft of current?

Or

(b) Use traverse tables find the course and distance between

(i) Position A : 03° 12.0'N, 004° 11.3'E

(ii) Position B : 02° 30.4' S, 002° 10.0'W.

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C–8195	Sub. Code
	11632

B.Sc. DEGREE EXAMINATION, APRIL 2023

Third Semester

Nautical Science

CARGO HANDLING AND STOWAGE - I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Enlist any four deck equipment.

2. State whether the container ship is single deck ship or multi-deck ship.

3. What is Ullage?

4. Define Dead weight.

5. How can you control the sweat by ventilation?

6. What are Reefer ships?

7. Mention the importance of preventer guys.

8. What do you understand by the term union purchase?

9. Express TEU.

10. State the use of brine traps.

Part B (5 × 5 = 25)

Answer **all** questions

11. (a) Describe the arrangements heavy lift cargoes.

Or

(b) What are offshore supply vessels? State their importance.

12. (a) What is factor of safety? Express with an example.

Or

(b) Distinguish between Gross tonnage and Net tonnage.

13. (a) What will happen, if the ventilation is not adequate? Explain with an example.

Or

(b) With simple sketch explain the efficient means of securing deck cargoes.

14. (a) State the derricks rigging procedures.

Or

(b) Explain the working of ship's cranes.

15. (a) With an aid of neat sketch explain the parts of a container.

Or

(b) State the securing procedures of a container on board ship.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Draw the neat sketch of a Derrick and label its parts.

Or

(b) How does the care of cargo play an important role in economical operation of the ship?

17. (a) With an aid of neat sketch explain the ventilation system for tanker ship.

Or

(b) Sketch and explain the ballasting and de-ballasting system of ship.

18. (a) What are the operational checks to be done on ships cargo gear before handing over to stevedores.

Or

(b) Explain the segregation and care of containers carrying Dangerous cargo.

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C–8196	Sub. Code
	11633

B.Sc. DEGREE EXAMINATION, APRIL 2023

Third Semester

Nautical Science

MARINE ENGINEERING AND CONTROL SYSTEM - I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** the questions.

1. State the properties of mild steel.

2. Why do bottom end bolts be exposed to potential fatigue failure?

3. Specify the use of a stuffing box?

4. What is the use of thermostatic valve?

5. Why do we prefer submersible pumps for chemical tankers?

6. What are Reefer compartments?

7. Describe P–V diagram.

8. Differentiate 2–Ram and 4–Ram system in steering gears.

9. Write the types of prime mover.

10. Define power and power factor.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Explain the heat treatment process of steel.

Or

(b) Explain the classification of engineering materials. Express the uses of ceramics.

12. (a) What are the safety cut out provided in Marine boilers?

Or

(b) With the aid of diagram, Explain the process of a fresh water generator.

13. (a) Describe the cold storage system on board the ship.

Or

(b) Express the causes of reduction in suction pressure in Air conditioning.

14. (a) How will you check the crankcase deflections?

Or

(b) Explain the faults detected in the main engine

(i) Early Injection

(ii) Late Injection

(iii) Loss of compression.

15. (a) Write down the routine maintenance carried out in generator on board ship.

Or

(b) Discuss shortly about circuit breakers and protectors.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) With a neat diagram, explain the working of Cohran boiler on board the ship.

Or

(b) Explain the central air conditioning system of the passenger ship.

17. (a) Draw the neat diagram of a fuel injector and explain the working.

Or

(b) Explain in detail with neat diagram about two stroke and four stroke engines.

18. (a) Explain with neat diagram about parallel operations of D.C generator and also explain about load sharing.

Or

(b) Explain the shore supply connection arrangements made during dry-dock.

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C–8197	Sub. Code
	11634

B.Sc. DEGREE EXAMINATION, APRIL 2023.

Third Semester

Nautical Science

VOYAGE PLANNING AND COLLISION PREVENTION - I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. Define International Dateline.

2. What is depth contours?

3. Express the uses of Sector lights.

4. What do you understand by the term chart datum?

5. State the meaning of Compass bearing.

6. Does the liquid used inside the Compass bowl will freeze in cold region? If not, justify your answer.

7. Define Leeway.

8. How will you measure the angle of a shore object from the ship?

9. What do understand by the term DR position?

10. What is the reason for Large Cocsked hat?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) How will you read the Latitude and Longitude?

Or

(b) State the reasons for using nearest lat scale for measuring distances.

12. (a) Discuss the degree of reliability of information shown on the chart.

Or

(b) State the different Clearing marks used to avoid collision.

13. (a) Enlist the caution for abnormal refraction.

Or

(b) Explain the process of Compass error correction.

14. (a) Express about True, Magnetic and Compass course.

Or

(b) Discuss the effect of current on ship's courses.

15. (a) Explain about compass error for the ship's head.

Or

(b) What is Gyro error? Describe the correction procedure.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Discuss briefly about the different types of charts used for navigation.

Or

(b) With the aid of neat sketches explain the different shapes of lights used for navigation.

17. (a) Explain the process of calculating variation from the data given on compass rose.

Or

(b) How will you convert the Gyro course to true course? Explain in detail.

18. (a) Discuss the process of plotting the position line by an astronomical observations.

Or

(b) With an aid of neat sketch explain how you will find the compass course between two points on the chart.

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C–8198	Sub. Code
	11635

B.Sc. DEGREE EXAMINATION, APRIL 2023.

Third Semester

Naval Architecture - II

NAUTICAL SCIENCE

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Centre of Floatation.

2. Mention the rolled sections used in ship constructions.

3. State the particulars available in General arrangement plans of vessel.

4. Why do the web frames are used in ship construction?

5. What is the role of Bilge keel?

6. State the location of Wing tanks on board ship.

7. Define the Simpson's Third Rule.

8. Define deserved buoyancy.

9. Define free board.

10. What are the uses of Ballast tanks are provided on board?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Describe the functions of Water tight bulk head.

Or

(b) What are Torosional stresses? With a neat diagram explain its arrangements.

12. (a) How will you reduce the panting and pounding stresses at sea?

Or

(b) What is kitchen rudder? Draw the neat sketch of it.

13. (a) State the ventilation arrangement requirements on board Tanker ship.

Or

(b) Enlist the factors affecting the position of Centre of Buoyancy.

14. (a) When a weight of 800 t is shifted to aft in ship of 330 m long, it causes the ship's CG to move 0.4 m horizontally and the trim to change 0.30 m Find longitudinal moment metacentric heights.

Or

(b) Draw neat diagram of Transverse metacentric height and label its parts.

15. (a) How will you reduce the corrosion rate of ship's hull. Justify with neat sketch.

Or

(b) Enumerate the Hydrostatic particulars available in stability data book.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Draw the neat cross – section of an Unbalanced Rudder and label all parts.

Or

(b) MV HINDSHIP floating in condition No. 5 discharged the entire cargo from No. Poop deck and refrigerated Cargo spaces, No. 3 Double bottom tank (c) is filled with ballast. FSC in final condition is 0.175 m. Calculate her GM (fluid)

17. (a) "MV HINDSHIP" in a river port in water of relative density 1.125 has a displacement of 16800 t GM is 0.98 m. FSC is 0.152 m she loads 255 t of cargo kg 7.5m 128 t of water ballast is run into No. 2 DB tank. Find the final KG.

Or

(b) "MV HINDSHIP" is in condition No 2 find her KM after the following operations are carried out:

(i) Loads 1 TD 490 t

(ii) Loads 3 Hold 1260 t, kg 1.6m

(iii) Unload 5 Hold 375t

(iv) Pump in Fore peak tank

(v) Pump out No. 4 D.B. Tanks (P & S)

Find FSC in the final condition in 0.19 cm.

18. (a) What are Classification societies? Explain their roles in maintaining ships standards.

Or

(b) Sketch the Mid – Ship section of chemical carrier ship and label all parts.

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C–8199	Sub. Code 11636

B.Sc. DEGREE EXAMINATION, APRIL 2023

Third Semester

Nautical Science

SHIP OPERATION TECHNOLOGY - III

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. How will you measure the thickness of hull plates?

2. Enumerate the equipments used to reduce the rolling of ships at sea.

3. Define Planned Preventive Maintenance system.

4. What are cross joint wedge mechanism?

5. Define the process of corrosion.

6. What is EPIRB?

7. Expand SMCP.

8. Why do the ships docked at a defined period?

9. What is the role of Classification societies?

10. State the signal to be exhibited by the aircraft man who has noticed the survivor at sea.

Part B (5 × 5 = 25)

Answer **all** questions

11. (a) What are Davits? Express their working with an aid neat sketch.

Or

(b) Explain the inspection procedure of Rudder at dry-dock.

12. (a) Why do we carryout hose test? State the procedures of hose testing?

Or

(b) State the different methods surface preparation of plates at shipyard.

13. (a) Express the various components of a shipboard GMDSS station.

Or

(b) Describe the process of post control fumigation of hold spaces.

14. (a) Mention the significant benefits for seafarer under RPSL Rule 2005.

Or

(b) List the contents of Muster list.

15. (a) What is towing? Specify the arrangements to be made for towing a ship at sea.

Or

(b) What is LAMSAR? State the contents of it.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) In normal condition, how many anchors are carried on board ship. Explain the survey procedures and marking of anchor and chain cable prior to usage on board ship.

Or

(b) Discuss the procedure for abandoning the ship.

17. (a) Explain the communication procedures under GMDSS in distress and safety situations in accordance with SOLAS Regulation.

Or

(b) Explain the measures for assisting a vessel in distress at sea.

18. (a) Write short notes on:

(i) Hot work permit

(ii) Working aloft permit

(iii) Working over side permit

Or

(b) Explain the DGS Order with respect to Recruitment, Placement Services License to seafarer.

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C–8200	Sub. Code
	11637

B.Sc. DEGREE EXAMINATION, APRIL 2023

Third Semester

Nautical Science

NAVIGATION – II

(2016 onwards)

Duration: 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. Define "Ecliptic" on celestial sphere.

2. What is Zenith Distance?

3. Define the term Amplitude of sun.

4. What is Prime vertical?

5. Explain Zenith and Nadir.

6. Define Right Ascension.

7. Explain Sensible Horizon, Visible Horizon, Rational Horizon.

8. What do you understand by advancing of ship's clocks?

9. Explain Equinoxes and Solstices.

10. Enumerate the twelve Zodiac signs.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) List out the corrections to be applied for obtaining True Altitude of sun, moon, stars.

Or

(b) Why do stars rise four minutes earlier each day?

12. (a) What is International Date line? What are Zone time and Standard time?

Or

(b) Define Local Mean Time. Convert the time $09^H\ 23^m\ 14^s$ to arc without using the tables.

13. (a) Find Moons GP at GMT $10^H\ 11^m\ 13^s$ on 04^{th} march 2008.

Or

(b) On 29^{th} Nov. 2008 in D.R. 26° 27'N 130°27'W at East of Meridian, the chronometer showed $05^H\ 49^m\ 20^s$ (error $01^m\ 31^s$ fast). Find the correct GMT date and time.

14. (a) Explain the principle of working of a Marine Sextant.

Or

(b) Explain calculation of Horizontal sextant angle and Vertical sextant angle.

15. (a) Find LHA of Star CANOPUS on 21st Sep. 2008 P.M. in DR 43° 18'S 140° 11'W when GMT is $22^{D}\ 07^{H}\ 31^{m}\ 04^{s}$?

Or

(b) On 23rd Sep 2008, the sextant altitude of Sun's LL was 56° 19.8'. If HE was 12 m and Index Error was 2.8' on the arc. Find TZD.

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

Answer **all** questions.

16. (a) On 20th July, 2008, AM at ship in DR 44° 31'N 069° 42'E, the azimuth of the sun was 100°(c) when chronometer showed $04^{H}\ 01^{m}\ 52^{s}$ (error $04^{m}\ 20^{s}$ slow). Variation was 8°E. Find deviation of ships head.

Or

(b) On 27th April 2008 AM at ship in DR 30° 30'N 140° 11'W, the moon bore 204°(G) at $16^{H}\ 30^{m}\ 56^{s}$ by GPS time. Calculate the Gyro error.

17. (a) On 28th April 2008 in DR 25° 20'N 075° 00'E the sextant Meridian Altitude of Moons LL was 42° 05.8'. If IE was 1.5' off the arc, HE was 25m. Calculate Latitude and LOP.

Or

(b) On 17th Jan 2008 PM at ship in DR 34°36'N 093°30'W the sextant Altitude of Moon's UL was 48° 15.4'. When chronometer showed $10^{H}\ 44^{m}\ 12^{s}$ (error $03^{m}\ 29^{s}$ slow). If HE was 16 m, IE was 2.8' on the arc. Calculate intercept and the direction of LOP?

18. (a) Explain with neat diagram Equinoxes, Solstices, First point of Aries First point of Libra, Ecliptic and Equinoctial.

Or

(b) Explain with neat diagram the three main systems of defining a position on the celestial sphere? Which is most widely used for navigation?

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C–8201	Sub. Code 11642

B.Sc. DEGREE EXAMINATION, APRIL 2023.

Fourth Semester

Nautical Science

CARGO HANDLING AND STOWAGE – II

(CBCS – 2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What are the uses of brine traps?

2. Define LFL and UFL.

3. What is meant by angle of repose?

4. What is Moisture migration?

5. What is Timber Carrier?

6. List down the types of hatch cover.

7. Define DOA.

8. Enumerate the uses of shifting boards in grain carrier.

9. State the purpose of PV breaker in IG system.

10. Describe Static Electricity.

Part B (5 × 5 = 25)

Answer **all** the questions.

11. (a) Specify the inspections carried out during and after loading the oil cargo.

Or

(b) What are the preparations to be carried out before loading the container?

12. (a) Specify the safety precaution to be followed during loading of iron ore.

Or

(b) Explain flow moisture point and transportable moisture limit.

13. (a) Describe the any three cargo hold cleaning equipment.

Or

(b) What deck Log book? List down the contents of it.

14. (a) Explain grain loading booklet for grain carrier.

Or

(b) What are the documents required prior loading of cargo in bulk carrier?

15. (a) What is Oil Record Book? What are the entries to be filed in oil tanker?

Or

(b) Explain briefly about the Cargo Oil Pump (COP) in oil tanker.

Part C

$(3 \times 10 = 30)$

Answer **all** the questions.

16. (a) Explain the construction of container ship with neat sketch.

Or

(b) Explain briefly about Timber Carrier with neat layout.

17. (a) What is SOPEP? Explain the equipments used in SOPEP.

Or

(b) What safety precautions are to be followed in the pump room of oil tanker? Explain in detail.

18. (a) Explain IG system with neat sketch.

Or

(b) Explain the types and uses of Boilers used on board ship.

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C–8202	Sub. Code
	11643

B.Sc. DEGREE EXAMINATION, APRIL 2023

Fourth Semester

Nautical Science

MARINE ENGINEERING AND CONTROL SYSTEM –II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is Emergency bilge suction?

2. How far from nearest land cargo residues contained in load water are allowed to discharge?

3. Which type of pump is usually used as cargo pump onboard oil tankers?

4. What are the three types of Scavenging?

5. What is basic difference between impulse and reaction turbines?

6. What is the purpose of slope tank?

7. What are following stands for

   (a) SOLAS (b) BDB, (c) STCW,

   (d) MARPOL

8. What are Engine four strokes?

9. What is Total head on a pump?

10. What is MARPOL Annex 1 ?

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

Answer **all** questions.

11. (a) Explain Emergency steering procedure, sequentially.

Or

(b) What are engine indicator diagrams? Draw power indicator card.

12. (a) What are to check prior bunkering, during bunkering and after bunkering as a deck officer?

Or

(b) How fuel oil is treated onboard ship to reduce viscosity for injecting into engine to obtain optimum power?

13. (a) What is purpose of windlass and mooring winch and safeties observed during its operations?

Or

(b) Why snap-back zones are marked around mooring winch, bits, fairlead rollers, etc,?

14. (a) List out LSA/FFA items and where from emergency fire pump can be started remotely?

Or

(b) Sketch and explain Fixed CO_2 Fire Extinguishing system.

15. (a) List out difference between four stroke and two stroke engines.

Or

(b) What is supercharging and how it is performed.

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

Answer **all** questions.

16. (a) Sketch and explain how is Engine heat dissipated by fresh water cooling system.

Or

(b) Explain auto helm with a simplified block diagram.

17. (a) Discuss in details of Diesel–Electric main propulsion.

Or

(b) Sketch and explain Biological sewage treatment system and its limitations.

18. (a) Explain unmanned Machinery space operations.

Or

(b) Sketch and explain Fixed pitch propeller.

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C–8203	Sub. Code
	11644

B.Sc. DEGREE EXAMINATION, APRIL 2023.

Fourth Semester

Nautical Science

VOYAGE PLANNING, COLLISION PREVENTION - II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. What is Running Fix?

2. Explain doubling the angle on the Blow.

3. What is the point to the borne in mind when transferring the ship's passion from 1 chart to another?

4. Why you should always use the largest scale chart available?

5. Write four points to remember on the use of charts.

6. What is the purpose of Compass Rose on chart?

7. Why the Latitudinal scale is used for measuring distance on Navigational chart?

8. Explain Parallel Sailing.

9. Why it is vital importance to keep all charts required for the voyage properly corrected?

10. Briefly explain NP 5011.

Part B (5 × 5 = 25)

Answer all questions.

11. (a) What are the information you will get from "Sailing Directions"?

Or

(b) Write the information you will get from "Ocean Passages of the World"

12. (a) Write the information you will get from "Routeing Chart".

Or

(b) What are the "Day and Night Signals" a "Fishing V/L" will display when the gear is extending more than 150 m length?

13. (a) Which part od the collision prevention regulations 1972 deals with sound and light signals? Which annex is reffered under these rules?

Or

(b) What is part F od collision prevention regulations 1972? Why was it added to the rules?

14. (a) Explain with neat diagram latitude and longitude.

Or

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

15. (a) What do you understand by the term course and bearing? Explain True course and True bearing.

Or

(b) Differentiate course steered and course made good.

Part C

$(3 \times 10 = 30)$

Answer all questions.

16. (a) What are the various categories of Navigational charts. Explain small scale and large scale chart.

Or

(b) Name six nautical publications. What is the use of "Guide to Port Entry"?

17. (a) Define "Mast Head Light" and "Towing Light".

Or

(b) What are the information you will get from "Sailing Directions" and "Ocean Passages of the world"?

18. (a) (i) What is "Lubber Line"?

(ii) Where is the location of Gyro repeaters on board ship?

(iii) What is the use of Azimuth mirror?

Or

(b) (i) How frequently Magnetic compass and Gyro compass is compared and checked?

(ii) What is lookout? Explain duties of lookout.

(iii) Define "narrow channel and fairway"

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C–8204	Sub. Code
	11645

B.Sc. DEGREE EXAMINATION, APRIL 2023.

Fourth Semester

Nautical Science

NAVAL ARCHITECTURE - III

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Describe air draught.

2. What is the purpose of Launching?

3. Define Centre of Buoyancy.

4. Where will be the position of center of gravity of a hanging mass?

5. What is the role of DGS?

6. Define Center of Floatation of ship.

7. Describe 'LBP'

8. State the permeability limit for Accommodation area of ship.

9. Define Trimming moment.

10. What is bilging?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What is the use of moulding loft in shipyard prefabrication centre?

Or

(b) Draw the cross section of the passenger ship and label the main parts of the ship.

12. (a) Describe angle of loll with neat diagram.

Or

(b) How will you prepare the ship for Drydocking?

13. (a) What are the structural fire protection in cargo ship?

Or

(b) Explain cargo ship construction rules. Briefly.

14. (a) A ship of 2000 tonne displacement has a mass of 50 tonne on fore peak at 18 , forward of mid ship. Calculate the shift in centre of gravity of the ship if the mass is moved to a position of 5 m forward of mid – ship.

Or

(b) A box shaped vessel of 100 m long and is floating even keel at 5.8 m draught has a midship compartment of 10 m long and is empty. Find the increase in draught if this compartment is bilged.

15. (a) Explain the tonnage regulations.

Or

(b) A ship of 6500 tonne displacement, 120 m long floats at a draught of 6.0m. Calculate the wetted surface area of the strip.

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

Answer **all** questions.

16. (a) A ship of 160 long, COF 1.5 m aft of mid–ship, MCT1C 80 tonne floats at draught of 5.6 m fwd. and 7.4m , aft. Find the new draught, if the 300 tonne is discharged from a position of 40 m abaft of mid-ship.

Or

(b) Derive the equation for angle of Loll.

17. (a) State the three conditions of equilibrium of ship with neat sketches.

Or

(b) Discuss the structural fire protection arrangements provided on passenger ships.

18. (a) Explain sub – divisional Load lines on passenger ship.

Or

(b) Write notes with suitable diagram on:

(i) Center of Buoyancy

(ii) Metacentric height

(iii) Centre of Gravity

(iv) Reserve buoyancy

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C–8205	Sub. Code
	11646

B.Sc. DEGREE EXAMINATION, APRIL 2023.

Fourth Semester

Nautical Science

NAVIGATION - III

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Great circle sailing

2. What do you understand by the term Almanac?

3. Express Moon's axial rotation.

4. What is lunar day?

5. What is the use of Radar?

6. What is North Pole star?

7. State the propagation speed of sound waves in sea water.

8. How can you measure the altitude while sailing at sea?

9. State the function of Ship's receiving Antenna.

10. Why do we use Gyro repeaters?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) How to find the distance between two points on the Earth's surface by shortest route.

Or

(b) What is difference between UMBRA and PENUMBRA.

12. (a) How does VDR help in merchant ship voyage?

Or

(b) With an aid of neat diagram describe the uses of radar.

13. (a) What is DGPS? Explain its influence in Merchant navy.

Or

(b) Describe the uses of Ocean Passages of the world.

14. (a) Enlist the properties of Gyroscope.

Or

(b) State the danger of placing implicit reliance upon floating navigational aids

15. (a) How do the course recorder works? Describe in detail.

Or

(b) How will you measure the depth of sea? Express in detail with a neat diagram.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) On 10th Jan 2009 in DR, at 1100 ship's time 26°^45'N the pole star bore 354°(C). If, the variation was 1.6° W, find the deviation of the ship's head?

Or

(b) Discuss the procedure to find the Course and Distance between two points on Earth's surface with neat diagram.

17. (a) Explain the phases of moon with neat sketches.

Or

(b) Explain principles of working of echo sounder with neat sketch.

18. (a) Draw the neat sketch of Gyro compass and explain its working principles, properties and errors correction procedure.

Or

(b) What are care and checks carried out in coarse recorder? Explain in detail.

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C–8206	Sub. Code
	11651

B.Sc. DEGREE EXAMINATION, APRIL 2023

Fifth Semester

Nautical Science

CARGO HANDLING AND STOWAGE – III

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Write a short notes on 'JETTISONING OF CARGO'?
2. What do you understand by the word "Rolling period"?
3. Describe "CARGO CLAIMS"?
4. Discuss about "HEAVY LIFT" in short.
5. What do you know about "IGC code"?
6. How many types of gas tankers in the Industry? What are they?
7. Explain UN number.
8. Briefly explain about "CARGO GEAR".
9. Define "centre of Gravity".
10. How does the Auto cut off works in the Cargo tanks?

Part B (5 × 5 = 25)

Answer **all** the questions.

11. (a) Describe the actions to be taken on Cargo overboard?

Or

(b) Write a short notes on "ICE ACCREATION".

12. (a) Draw a simple diagram of Timber load line.

Or

(b) Draw a Flammable limit diagram and explain its parts.

13. (a) Write a brief notes on IMDG code.

Or

(b) What do you understand about cargo damage and its consequences?

14. (a) What are the types of gas Tankers? Explain the Control Systems?

Or

(b) Write the brief notes on the following:

(i) Re-liquification plant

(ii) Deep well pump

15. (a) What are the limitations on carriage of Explosives?

Or

(b) Explain the following terms:

(i) IGC Code

(ii) Certificate of fitness.

Part C (3 × 10 = 30)

Answer **all** the questions.

16. (a) What are the conditions for carrying Timber deck cargo as per code of safe working practices?

Or

(b) Define the following terms:

(i) Sea Worthiness

(ii) Bale capacity

(iii) List

17. (a) What are the classifications of dangerous goods in accordance with IMDG code?

Or

(b) Write brief notes on the following:

(i) TLV

(ii) IBC Code

(iii) P & A Manual

18. (a) Length of the hold 17m. Breadth : 10m , Height : 9m, SF : $2.7 m^{3/t}$ is to be loaded. Find the weight of the cargo that can be loaded in the hold, if expected broken stowage is 11%.

Or

(b) The dimensions of Tween deck (Bale capacity 760 M^3) are 13x10x6m. 220 tonnes of cotton bales $\left(SF\ 2.35\ m^{3/t}\right)$ and Broken stowage 7% are to be loaded. Calculate the height of the empty space that left in the cargo hold.

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C–8207	Sub. Code
	11661

B.Sc. DEGREE EXAMINATION, APRIL 2023

Sixth Semester

Nautical Science

MARINE ENVIRONMENTAL PROTECTION

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** the questions.

1. Name the international convention for prevention of pollution from the ships.

2. Write a short notes on liability against marine pollution.

3. What are the oil filtering equipments used on board ship?

4. Describe the oil discharge and monitoring control system used on board vessel.

5. Discuss on exception survey.

6. What do you know about cargo record book and its parts?

7. How does the sewage system utilized on ships?

8. Explain why the Nitrogen oxides (Knox) effects the environment?

9. What do you understand on Air pollution from the ships?

10. Which are the special areas in concerned with MARPOL Annex-V?

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

Answer **all** the questions.

11. (a) Write a brief history of MARPOL convention.

Or

(b) What are Annexes of MARPOL 73/78? Explain each Annex.

12. (a) What are the requirements for crude oil washing (cow)?

Or

(b) Discuss the regulations for oil discharge outside the special area.

13. Describe the following terms.

(a) Segregated ballast tanks.

Or

(b) Oil/water interface detector.

14. (a) Write brief notes on SOx.

Or

(b) Control of discharges of residues of Noxious liquid substances.

15. (a) List the equipments available in the SOPEP locker.

Or

(b) What do you know about global warming.

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

Answer **all** the questions.

16. (a) Discuss briefly about "National pollutant discharge elimination system (NPDES).

Or

(b) Port state control on operational requirements.

17. (a) What are the special areas in accordance with 6 annexes of MARPOL 73/78.

Or

(b) Explain all the entries that to be made in "oil record Book" under the both parts.

18. (a) Describe in detail about garbage management plan and garbage record keeping.

Or

(b) What is the procedures to be followed when discharging sewage from the ship?

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C–8208	Sub. Code 11662

B.Sc. DEGREE EXAMINATION, APRIL 2023

Sixth Semester

Nautical Science

SEAMANSHIP PRACTICES

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What are three types of ropes use on-board?
2. Define wrap lay and unkinkable lay.
3. Define corrosion.
4. When the distance a pilot has to climb is more than 9m, describe what type of arrangement must be used for access?
5. Define Air draft.
6. What do you mean by running paint defect? How can you prevent it?
7. Define
   (a) Lee tide
   (b) Weather tide
8. What do you mean by walking back anchor?
9. What is a lugless joining shackle?
10. Describe and the state the function of the reef knot.

Part B (5 × 5 = 25)

Answer **all** the questions.

11. (a) Explain briefly the care and maintenance of polypropylene rope.

Or

(b) Write a short note on the lay of the rope.

12. (a) What are the preparations to be carried out before a berthing operation?

Or

(b) How to berth a ship in a current.

13. (a) What are preparations to be carried out before anchoring a ship?

Or

(b) How to secure anchor for sea?

14. (a) What are the LSA and FFA items on board?

Or

(b) Describe the safe working practices to be followed when the ship is in dry dock.

15. (a) What are the precautions to be taken before flooding the engine room with CO_2?

Or

(b) How to rig a pilot ladder? What are the precautions to be taken while rigging it?

Part C

$(3 \times 10 = 30)$

Answer **all** the questions.

16. (a) Explain the preparation to be carried out before a dry dock? What are precautions to be taken while entering a dry dock?

Or

(b) What are the duties of the OOW during anchor watch?

17. (a) Explain the launching of a life raft manually? List out the equipment to be contained in a life raft as per SOLAS.

Or

(b) What is EPIRB? Explain its function?

18. (a) Explain the procedure for dropping anchor in an emergency?

Or

(b) How to take over a navigational watch at night?

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C–8209	Sub. Code 11663

B.Sc. DEGREE EXAMINATION, APRIL 2023

Sixth Semester

Nautical Science

CONVENTION AND REGULATION

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What do you understand by term "IMO convention"?

2. What is the function of WHO in shipping?

3. What is the hours of work and hours of rest mandated by STCW convention?

4. What is chapter III and chapter V of solas?

5. Define Noxious Liquid Substance (NLS).

6. Define territorial sea as per unclos.

7. Define IAMSAR.

8. What is the meaning of "Hot Pursuit"?

9. Define SECA as per MARPOL convention.

10. What is SOPEP manual and what is its use on ship?

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

Answer **all** questions.

11. (a) Name special areas under Annex v of MARPOL.

Or

(b) What is the discharge criteria from cargo oil tank spaces inside special areas under MARPOL Annex I?

12. (a) State and describe the objectives of LSA code, FSS code, ISM code, ISPS code.

Or

(b) What is the job responsibility of master and DPA as per ISM code? Under what circumstances you will contact DPA?

13. (a) What is SMPEP and SEEMP?

Or

(b) What is the purpose of MLC and DMLC?

14. (a) Define

(i) Internal waters

(ii) Contiguous zone

(iii) High seas

(iv) Continental shelf

(v) Flag state.

Or

(b) Describe contents of P and A manual found in chemical tankers.

15. (a) Define GRT, NRT, FREEBOARD as per load line convention.

Or

(b) Write short notes on COLREG.

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

Answer **all** questions.

16. (a) Write down steering gear tests and drills as per chapter V, Reg 26 of SOLAS.

Or

(b) Enumerate Reg 19 - conduct of vessels in restricted visibility as per COLREG.

17. (a) Explain in detail the structure of IMO and its functions. Name and describe its main conventions in force.

Or

(b) How a convention is developed and adopted? What is ratifying of a convention?

18. (a) Define

(i) IAPP certificate

(ii) IOPP certificate

(iii) SBT's

(iv) ODMCS

(v) COW

(vi) VOC's

(vii) SLUDGE

(viii) Declaration of security

(ix) SSP

(x) LOAD LINE MARK.

Or

(b) Explain in detail the layout and contents of IMDG code.

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C–8210	Sub. Code 11664

B.Sc. DEGREE EXAMINATION, APRIL 2023

Sixth Semester

Nautical Science

MARITIME LAW

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is public law?
2. What is the scope of maritime law?
3. What do you understand by restoration?
4. What is an insurable interest in a policy?
5. Mention any two types of marine insurance policies.
6. Define ship wreck.
7. What does jettison mean?
8. Define law of refuge.
9. stsdsd?
10. Define maritime labour law.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What is breach of contract? What are the remedies for the breach?

Or

(b) Differentiate between common law and maritime law

12. (a) Write a short on Hamburg rules .

Or

(b) Explain the concept of Hague visby rules.

13. (a) What are common maritime frauds and Illegal Activities on Board ships?

Or

(b) What is the liability of a pilot versus responsibility of a master?

14. (a) Describe the examinations for, and grant of certificate of officers as per merchant shipping Act 1958.

Or

(b) Describe the form of certificate of competency (COC) granted under the merchant shipping Act 1958.

15. (a) Briefly describe the specialised agencies that regulate the maritime law.

Or

(b) What are your duties as a 2nd officer as per ISPS?

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Briefly Explain about limitation and liability section 352 and 352f.

Or

(b) Define charter party and mention about the types of charter parties briefly.

17. (a) Write short notes each on governmental/non governmental departments dealing with shipping.

Or

(b) What amounts to frustration in a contract and how to deal with it?

18. (a) Elaborate the concepts about International ship and port facility security code.

Or

(b) What do you understand by abandonment of seafarers?

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C–8211	Sub. Code 11665

B.Sc. DEGREE EXAMINATION, APRIL 2023

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. State the use of whirling psychrometer.
2. What do you meant by synoptic hours?
3. Define Monsoon.
4. Write the properties of tropical Air mass.
5. Differentiate vertex and vortex of a TRS.
6. Short note in storm surge.
7. State, the limitations of weather roueting.
8. A short note on Green house effect.
9. Difference between weather and climate.
10. What do you meant by westerlies?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Briefly describe the relationship between ocean water temperature and salinity.

Or

(b) Describe the principle and construction of Aneroid Barometer.

12. (a) Give a note on Doldrum and ITCZ.

Or

(b) Briefly explain some local winds.

13. (a) Describe about solar radiation and terrestrial radiation.

Or

(b) What is the structure of weather bulletin?

14. (a) Briefly explain about Ship's performance curve.

Or

(b) What are the advantages of weather routeing?

15. (a) Describe how a front is detected by a meteorologist.

Or

(b) Briefly explain Anabatic and Katabatic winds.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Describe the structure of a tropical revolving storm and weather associated with it.

Or

(b) Explain the classification of voluntary observing fleet under IMD.

17. (a) Define a front and explain in detail about the weather associated with various types of front.

Or

(b) Describe about various types of meteorological services for shipping.

18. (a) Explain in detail about the distribution of atmospheric pressure and wind system.

Or

(b) Define Air mass and explain the factors governing the development of an Air mass.

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C–8212	Sub. Code
	11666

B.Sc. DEGREE EXAMINATION, APRIL 2023

Sixth Semester

Nautical Science

NAVIGATION – V

(2016 onwards)

Duration: 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. List out causes of magnetism in the ships structure.

2. What is coefficient B?

3. What are the uses of Marine Radar?

4. What is HDOP and GDOP?

5. Define AIS and its uses.

6. What is EPIRB?

7. What is the use of VDR on ship?

8. Define SONAR.

9. What is the working frequency of Echo sounder?

10. In which marine frequency SART is operated?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What is angle of dip in earth's magnetic field? Explain with diagram.

Or

(b) What are the causes of real coefficient A and apparent coefficient A?

12. (a) Explain working principle of marine radar.

Or

(b) What is RADAR PLOTTING and how it can be used for safe navigation of a ship?

13. (a) Describe working principle of EPIRB?

Or

(b) Explain how SART is used in emergency.

14. (a) What are the errors of a GPS fix?

Or

(b) Explain working principle of DGPS.

15. (a) What is phasing in echo sounder?

Or

(b) What is a transducer? Explain different types of transducers on a ship.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain ships permanent magnetism and induced magnetism with the help of diagram.

Or

(b) Explain the various segments of GPS with simplified block diagrams.

17. (a) What is S-VDR? What are the information available to coastal authorities in the system in any emergency situation?

Or

(b) What are the errors of a marine radar used on board ship? Explain.

18. (a) While steering 045°(G) and speed 16 knots the following observations was made on radar.

Gyro error = 1° (HIGH)

SHIPS TIME	BEARING (T)	RANGE (NM)
1000	004°	6.6
1100	005°	6.0
1130	006°	5.6

Find :

(i) CPA

(ii) TCPA

(iii) Course and speed of target

(iv) Aspect at 1100 hrs.

Or

(b) Explain with the help of block diagram the working of ECHO SOUNDER. Explain the functions and controls available to OOW of the echo sounder.

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