C–1503	Sub. Code
	11613

B.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Nautical Science

NAUTICAL MATHEMATICS – I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. Find the unit vector along a vector $2\hat{i} + 3\hat{j} - 4\hat{k}$.

2. If x is a random variable in a probability distribution

x :	–3	6	9
P(x) :	1/6	1/2	1/3

Find $E(x)$.

3. Define parabola.

4. Find the centre and radius of the circle $x^2 + y^2 + 2x - 4y + 3 = 0$.

5. State supplemental theorem for polar spherical triangle.

6. Write Haversine formula.

7. If $y = x^{\sin x}$, find dy/dx.

8. Evaluate $\int e^{2x} dx$.

9. Define rank of matrix.

10. State Cayley-Hamilton theorem.

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

Answer **all** questions.

11. (a) Find the value of m if $2\hat{i} - 3\hat{j} + 5\hat{k}$, $m\hat{i} + 2\hat{j} - \hat{k}$ and $3\hat{i} - \hat{j} + 4\hat{k}$ vectors are coplanar.

Or

(b) A bag A contains 2 white, 3 Red balls and a bag B contains 4 white, 5 Red balls, one ball is drawn at random and it found to be red. Find the probability that it was drawn from the bag B.

12. (a) Find the equation of the sphere having centre is $(7, 4, -3)$ and radius is 6 units.

Or

(b) A river is 80 feet wide, the depth 'd' in feet at a distance x from one bank is given by the table.

x :	0	10	20	30	40	50	60	70	80
d :	0	4	7	9	12	15	14	8	3

Calculate the area of cross section by using Simpson's rule.

13. (a) Define the following;

(i) Great circle

(ii) Small circle

(iii) Pole

(iv) Spherical angle

(v) Sin formula.

Or

(b) Prove that $\sin A/2 = \sqrt{\dfrac{\sin(s-b)\sin(s-c)}{\sin b \sin c}}$.

14. (a) If $\sin y = x \sin(a+y)$, prove that $\dfrac{dy}{dx} = \dfrac{\sin^2(a+y)}{\sin a}$.

Or

(b) Evaluate $\int \dfrac{dx}{x^2+3x-4}$.

15. (a) If $A = \begin{bmatrix} 3 & 1 & 0 \\ -1 & 1 & 1 \\ 2 & 3 & 4 \end{bmatrix}$ find $A^2 - 3A + 2I$.

Or

(b) Check whether the given vectors $(1, 1, 0, 1)$, $(1, 1, 1, 1)$, $(-1, 1, 1, 1)$, $(1, 0, 0, 1)$ are linearly independent or dependent.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Calculate standard deviation for the following data.
14, 22, 9, 15, 20, 17, 12, 11.

Or

(b) The probability density function of a random variable x,

x:	0	1	2	3	4	5	6
$P(x = x_i)$:	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

Find

(i) $P(x < 4)$, $P(x \geq 5)$, $P(3 < x \leq 6)$.

(ii) What will be the minimum value of k, so that $P(x \leq 2) > 3$.

17. (a) In spherical triangle pzx, right angled at z, $p = 110^\circ 20'$ and $z = 84^\circ 12'$. Find the values of P, x and x.

Or

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

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

Or

(b) Test for consistency and solve the system of equations $x - 4y + 7z = 14$, $3x + 8y - 2z = 13$, $7x - 8y + 26z = 5$.

C–1504

Sub. Code
11623

B.Sc. DEGREE EXAMINATION, APRIL 2024

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. Find the absolute value of $\frac{2+i}{4i+(1+i)^2}$.

2. Express $\frac{(1+3i)(1-2i)}{(3+4i)}$ in the form of $a+ib$.

3. Define numerical integration.

4. What is the order of error in Simpson's $\frac{1}{3}$ rule?

5. If Q is a solution of laplace equation, prove that ΔQ is irrotational.

6. Prove that $\Delta(\log r) = \frac{\bar{r}}{r^2}$.

7. Form the differential equation, $x = A\cos(nt+\alpha)$.

8. Write down the condition for the equation $M(x, y)\,dx + N(x, y)\,dy = 0$ is exact.

9. Solve

(a) $d[\log(y / x)]$

(b) $d\left[\tan^{-1}(y / x)\right]$

10. Solve $\left(D^2 - 2D + 2\right)y = 0$.

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

Answer **all** questions.

11. (a) Simplify : $(\cos 3\theta + i \sin 3\theta)^4 (\cos 4\theta + i \sin 4\theta)^{-5}$.

Or

(b) Separate the real and imaginary part of $e^{5 + i\pi/2}$.

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) If $\vec{F} = x^2\hat{i} + y^2\hat{j} + z^2\hat{k}$, find $div\,\vec{F}$ and $curl\,\vec{F}$.

Or

(b) If $\vec{F} = 3x^2\hat{i} + (2xz - y)\hat{j} + z\hat{k}$, evaluate $\int_C \vec{F}.dr$ where C is straight line from $(0, 0, 0)$ to $(2\ 1\ 3)$.

14. (a) Solve : $\frac{dy}{dx} = \frac{x(2\log x + 1)}{\sin y + y\cos y}$.

Or

(b) Solve $\left(\frac{e^{-2\sqrt{x}}}{\sqrt{x}} - \frac{y}{\sqrt{x}}\right)\frac{dx}{dy} = 1$.

15. (a) Solve : $(D^2 + 1)^3 y = 0$.

Or

(b) Find particular integral of $(D^2 + 16)y = \cos^3 x$.

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

Answer **all** questions.

16. (a) If $\cosh(u + iv) = x + iy$, prove that

(i) $\frac{x^2}{\cosh^2 u} + \frac{y^2}{\sinh^2 u} = 1$

(ii) $\frac{x^2}{\cos^2 v} - \frac{y^2}{\sin^2 v} = 1$

Or

(b) State and prove De-moirre's theorem.

17. (a) Use Gauss divergence theorem to evaluate $\iint_S \overline{F}.\hat{n}\,ds$ where $\overline{F} = x^3\hat{i} + y^3\hat{j} + z^3\hat{k}$ and S is the surface of the sphere $x^2 + y^2 + z^2 = a^2$.

Or

(b) Evaluate $\int_0^{\pi/2} \sin x\,dx$, using Simpson's 3/8 rule by dividing into 9 subintervals.

18. (a) (i) Solve : $\frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + x\cos y + x} = 0$.

(ii) Solve $(1 + xy)\,y\,dx + (1 - xy)\,x\,dy = 0$.

Or

(b) Solve : $(D - 2)^2 y = 8\left(e^{2x} + \sin 2x + x^2\right)$.

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C–1505	Sub. Code 11624

B.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Nautical Science

NAUTICAL PHYSICS AND ELECTRONICS – II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. State the effect of electro static charging on board ship.
2. Why do we use Nuclear energy as power source for ships?
3. Define Impedance.
4. What do you understand by the term skip zone?
5. Why do we convert Decimal to Binary systems?
6. Define NAND Gate.
7. What is the role of transistor as amplifier in CE mode?
8. Express the modulation concept of MCW.
9. State the function of Ship's receiving Antenna.
10. Why do we use Superheterodyne receivers on board ship?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Distinguish between electromagnetic ground waves and Sky waves.

Or

(b) Describe the electrostatic charging of oil in pipe line.

12. (a) Write short notes on electrical resonance in LCR circuits.

Or

(b) What preventive measures are to be initiated to avoid oil mixing with water onboard ship?

13. (a) Explain working of Monostable and Bistable multi vibrators.

Or

(b) Distinguish between Current gain and Voltage gain.

14. (a) Distinguish between AM and FM modulation.

Or

(b) With neat diagram explain the Transmitter used as amplifier switching device.

15. (a) What are the difference between Voltage and power amplifier?

Or

(b) State the working principle of ship borne VHF.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) What are impedance? Explain their concepts and effects in electrical circuits.

Or

(b) Discuss the process of detecting the Nuclear waste hazards and enumerate the safety measures are to be initiated for nuclear hazards.

17. (a) With an aid of neat diagrams explain the basic modes of using transistors in common base, common emitter and common collector configuration.

Or

(b) Explain the Modulation techniques, their advantages and disadvantages.

18. (a) Discuss briefly the Logic gates Digital electronics.

Or

(b) Explain the characteristics of Radio receiver such as Selectivity, Sensitivity and Fidelity.

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C–1506	Sub. Code 11626

B.Sc. DEGREE EXAMINATION, APRIL 2024

Second Semester

Nautical Science

NAVIGATION – I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Geographical mile.
2. What are Meridians?
3. Describe DMP.
4. On which basis the dates are changed in ships at sea?
5. Express Knot.
6. How will you measure the intensity of wind?
7. What are Local time zones?
8. What do you understand by the term deviation?
9. How will you measure the speed of ship?
10. Enlist any four Navigational instruments.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) With neat sketch describe the latitudes and longitudes.

Or

(b) Explain Gnomonic position.

12. (a) Name the documents to be recorded on bridge while at sea.

Or

(b) With net diagram explain the Boxing of Compass.

13. (a) Explain the advantages and disadvantages of Mercator charts.

Or

(b) Find Relative bearing from the following:

	1	2
T.Brg:	245°	28°
T.Course:	180°	95°
R.Brg:	---	---

14. (a) Discuss the procedure to obtain the position of the ship at any given time.

Or

(b) What are the effects of wind and current on estimated speed?

15. (a) Explain the procedure for checking accuracy of Azimuth error.

Or

(b) Find the position arrived after sailing 255°(T) for 1055 mile from a starting position P 00°04'S 170°10'W.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Write short notes on:

(i) Shape of earth.

(ii) Observed position

(iii) Revolutions of planets

(iv) Nautical scale

(v) Errors of Sextant

Or

(b) Find the course and distance of using parallel sailing

From A 44° 59'N 155° 18'E

To B 41° 35'N 140° 05'E

17. (a) Find the course and distance of using Traverse Table.

From A 35° 35'N 160° 25'E

To B 43° 18'N 172° 45'E

Or

(b) Find the Rhumb line course and distance from

starting position P : 18° 06'N 155° 15'W to

arrived position Q : 07° 05'S 181° 11'W

18. (a) With a neat diagram explain the principle and working of Azimuth Minor.

Or

(b) Day's work : On 13th Mar a ship in position 51° 54'S 161° 24'E steamed as follows:

	True	Co (c)	Dev.	L'way	Wind	Speed kn
13th	1200	170°	60°E 4°	SWXW	10	
	1600	160°	5°E 5	SWXW	10	
	2000	140°	3°E	NIL	SW	8
	2400	140°	3°E	NIL	SW	7.5
	0400	120°	4°E	NIL	S	8
	0800	100°	NIL	NIL	S	7
14th	1200	100°	NIL	NIL	S	7

Variation 10°E throughout. Find the DR position at noon on 14th Mar and if the observed position, then was 43° 12'S 165° 29'E. Find the set and drift of current.

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C–1507	Sub. Code 11632

B.Sc. DEGREE EXAMINATION, APRIL 2024

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. Define stowage factor.

2. What is bale capacity and grain capacity?

3. Name different type of containers.

4. Define ship sweat.

5. Define load density.

6. What is broken storage?

7. What is proof load?

8. What are Ro-Ro ship and what cargo do they carry?

9. Define sage working load.

10. Any two type of deck cargoes.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What are the marking in containers? What is the standard size of a container?

Or

(b) How will you monitor the temperature of bulk cargo loaded in hold while sailing?

12. (a) What is cargo stowage plan and pre stowage plan?

Or

(b) What are the documents required on board the ship prior loading of dangerous goods?

13. (a) Describe the following:

(i) Reefer cargo

(ii) Heavy life cargo.

Or

(b) What inspections are carried out before loading and discharge of refrigerated cargo?

14. (a) Briefly describe how will you carryout ballasting and de-ballasting operations.

Or

(b) State dunnaging required for refrigerator cargo.

15. (a) How cargo holds are ventilated? Explain type of ventilation system.

Or

(b) State the different between ship sweat and cargo sweat. What are the factor affecting sweat?

Part C

(3 × 10 = 30)

Answer **all** questions.

16. (a) Briefly explain about the preparation of cargo holds.

Or

(b) Explain in detail about the preparation of batch for loading grain cargo.

17. (a) State the duties on officer on cargo watch.

Or

(b) What are the entries to be made in post log book during cargo operations?

18. (a) Draw a simple derrick and label its parts.

Or

(b) Briefly explain load line of ship with a diagram.

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C–1508	Sub. Code
	11633

B.Sc. DEGREE EXAMINATION, APRIL 2024

Third Semester

Nautical Science

MARINE ENGINEERING AND CONTROL SYSTEMS – I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is the influence of carbon on steel?
2. Specify the methods of heat treatment of steel.
3. What is the effect of vacuum on flash point of water?
4. What is reefer compartment?
5. What is the advantage of Hydrophore system?
6. What is the function of circuit breaker?
7. What is Auto-pilot?
8. What is combustion in IC Engine?
9. What is the function of a Steering gear on board ship?
10. Define Alternator.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Discuss the elementary metallurgy of steel production.

Or

(b) Describe various types of steels and their uses.

12. (a) Describe the treatment for obtaining potable water.

Or

(b) Discuss the safety arrangements provided in Marine boiler.

13. (a) Describe the air conditioning arrangements on board ship.

Or

(b) Write short notes on step up and step-down transformer.

14. (a) Describe the working principle of Centrifugal pump.

Or

(b) Explain the safety and emergency arrangements provided in Steering gear.

15. (a) What are the two modern methods of steel making?

Or

(b) Explain P V diagram with neat sketch.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) With a neat diagram explain the working principle of fire tube boiler.

Or

(b) Enumerate the various types of pumps used onboard ship and explain the ballasting arrangements on ship with neat diagram.

17. (a) Draw a line sketch of a vapour compression system and explain its working.

Or

(b) Discuss the Electro hydraulic steering system with an aid of diagram.

18. (a) Label the components of a four stroke Marine propulsion engine with neat diagram.

Or

(b) State the Emergency power distribution arrangements made on board ship.

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C–1509	Sub. Code
	11634

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Third Semester

Nautical Science

VOYAGE PLANNING AND COLLISION PREVENTION – I

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10× 2 = 20)

Answer **all** questions.

1. Magnetic Direction is related to _____ Meridian.
2. Compass direction is related to the line taken up by _____.
3. What is a clearing Line?
4. What is Transit Bearing?
5. What is a fix Position?
6. Define RAM Vessel.
7. Define Inshore Traffic Zone
8. What is Tide?
9. Explain Phases of Moon
10. Where will you find "Number of Chart"? What is its significance?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What is Variation? Explain with suitable diagram.

Or

(b) What is Deviation? Explain with diagram.

12. (a) Explain what is Set and Drift.

Or

(b) Explain Course made Good.

13. (a) What are the corrections a Navigator will be required to apply to ensure Vessel maintain the true direction to its destination?

Or

(b) Differentiate CTS and CMG?

14. (a) What are True, Magnetic and Compass Courses and how are they Measured?

Or

(b) Explain True _____ Magnetic and Compass Direction.

15. (a) What is a Marine Sextant? Explain the Principles of HSA?

Or

(b) Explain methods of obtaining position circle using a Sextant.

Part C

(3 × 10 = 30)

Answer **all** questions.

16. (a) Write in details different types of Nautical charts.

Or

(b) What is Gnomonic Projection? What is the advantage of Gnomonic Chart?

17. (a) What is Restricted visibility? Explain a vessels action when not in sight of one and another.

Or

(b) What are the responsibilities between vessels as per Rule 18 of COLREGS?

18. (a) Explain with diagram of Horizontal Danger Angles.

Or

(b) Explain with diagram of Vertical Danger Angle.

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C–1510	Sub. Code
	11635

B.Sc. DEGREE EXAMINATION, APRIL 2024

Third Semester

Nautical Science

NAVAL ARCHITECTURE – II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Use Hydrostatic Particulars for solving M.V. Hindship Problems.

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is TPC and state its formula?

2. What is sterntube?

3. Define LCF.

4. What is LCG of a ship?

5. Do transverse bulkheads reduce free surface effects?

6. Which framing system is used for bottom shell framing for a vessel of 120 m or more in length?

7. What is the prime function of bilge keel?

8. Why are striker plates fitted below sounding pipes?

9. To what temperature is the steel heated during annealing?

10. What is bodily sinkage or rise?

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

Answer **all** questions.

11. (a) A ship's water-plane is 120 m long. The half-breadths, measured at equal intervals from aft, are: 0.1,4.6, 7.5, 7.6, 7.6, 3.7 and 0m. Find the water-plane area.

Or

(b) State different types of bulkheads.

12. (a) When a weight is shifted aft in a ship 120 metres long, it causes the ships center of gravity to move 0.2 metres horizontally and the trim to change by 0.15 metres. Find the longitudinal metacentric height.

Or

(b) What is the purpose of a Double bottom tank. Draw a neat sketch with transverse framing.

13. (a) A ship 120 m long, COF 2.5 m abaft amidships (HF 2.5 m aft), MCTC 100 tm, TPC 25 floats at 7 m fwd and 10 m aft. Find the new drafts if 200 t is discharged from a position 50 m abaft amidships.

Or

(b) Explain Hogging and sagging in still water and at sea.

14. (a) The breadths of part of a ship's deck, at 5 m intervals are 13, 14 and 14.5 m. Find the area between the first two ordinates.

Or

(b) Draw a sketch of a Hawse pipe and label it.

15. (a) Explain what are Panting and Pounding forces.

Or

(b) Explain the causes of corrosion.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) The transverse cross-sectional areas, of the underwater portion of a barge, at 12 m intervals from forward are: 0, 3. 17.5, 25 and 19.6 sq. m. The last ordinate is the after perpendicular of the barge. Calculate AB.

Or

(b) Draw a sketch of a corrugated watertight bulkhead and label the parts.

17. (a) MV. Hindship in Condition No.8, consumes the entire HFO from No. 5 DB tank (S), cg 4 metres from the centre line. Find the resultant list

Or

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

18. (a) A ship 100 m long, MCTC 280 tm, TPC 25, HF 2 m forward, is afloat at drafts of 6 m fwd and 8 m aft. Find how many tonnes of SW must be run into the fore peak tank(COG 48 m fwd of H) to bring the draft aft to 7.8 m.

Or

(b) Draw a neat sketch and explain Shell Expansion Plan.

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C–1511	Sub. Code
	11636

B.Sc. DEGREE EXAMINATION, APRIL 2024.

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. List out types of hatch covers?
2. Statutory certificates as per solas brief out.
3. Define emergency team.
4. What is MLC and it's purpose?
5. What is ITU in GMDSS?
6. Explain permit to work system on ships.
7. Explain methods of fumigation.
8. Define distress.
9. What do you understand by safety committee meeting?
10. Types of dry dock.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What are the different types of hatch covers used on board and explain the working methods of each hatch overs.

Or

(b) How will you get ready for De-rusting?

12. (a) What are the emergency teams and their duties delegated?

Or

(b) Explain abandon ship drill conducted on board the vessel.

13. (a) Sketch the cargo hold bolkhead and explain 1st parts briefly.

Or

(b) Safety precautions before entry into enclosed space.

14. (a) Explain about work permit on board.

Or

(b) List out the classification society.

15. (a) Explain ALRS volume 5.

Or

(b) Discuss the importance of personnel health and hygiene on board ship.

Part C

(3 × 10 = 30)

Answer **all** questions.

16. (a) Define

(i) EPIRB

(ii) SART

(iii) TPA

(iv) Immersion suit

(v) Line throwing apparatus.

Or

(b) Factors affecting navigation lights and how the procedure for maintenance of navigation lights is done on ships?

17. (a) With reference to emergency preparness discuss.

(i) Search and Rescue

(ii) Evacuation of critically injured presonnel

(iii) Helicopter operations

(iv) Rescue from enclosed space

(v) Abadon ship

Or

(b) How do you prepare deck for painting? Explain grades of paints used on board ship.

18. (a) Discuss about the piping arrangements on board used for bilges, fire pump, ballast pumps.

Or

(b) What is muster list, its content and requirements of muster list as per solas?

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C–1512	Sub. Code 11637

B.Sc. DEGREE EXAMINATION, APRIL 2024

Third Semester

Nautical Science

NAVIGATION – II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Note : 1. Draw diagram wherever it is applicable.

2. Use of Norie's tables or other tables allowed.

3. Use of 2008 Nautical Almanac is allowed.

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Prime Vertical.
2. Define the term "DECLINATION".
3. What is "International date Line"?
4. Define Visible and Sensible horizons.
5. What is the principle of sextant?
6. Define 'V' and 'd' corrections.
7. Define Right Ascension.
8. Define Zenith Distance.
9. Calculate the LHA of a star whose RA is 70°, for an observer in longitude 47°E, when GHAγ is 210°.
10. Define first point of Aries.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) How do the clocks are adjusted when a ship crosses an INTERNATIONAL DATE LINE? Explain.

Or

(b) Why stars rise, Culminate and set 4 minutes earlier than the sun each day?

12. (a) Define the term 'Equation of time'.

Or

(b) Write short notes on 'Zone Time'.

13. (a) (i) What do you understand by the term GP of a heavenly body? What are the coordinates used to specify a Geographical Position? (4)

(ii) State the GP of the Moon, when its GHA = 212° and Dec 22°S. (1)

Or

(b) What do you understand by the terms

(i) Equinox

(ii) Solstice.

When do they occur and what can be stated regarding the duration of day and night at such times?

14. (a) Solve the following :

(i) Compass course: 166°© True course: 175(T) Variation: 5°W. Find Deviation.

(ii) True course: 315°(T) Compass course: 317©. Find the compass Error.

(iii) Compass course: 086°© Dev: 5°W, Var 5°W. Find True course.

(iv) Find the compass error if Dev 5°W and Var. 7° E.

Or

(b) Find the LHA of the star CANOPAS on 21st Sept. 2008, PM in DR 43°18'S 140'11'W, GMT is 22D 07h 31m 04s.

15. (a) (i) Explain the term 'Intercept' with diagram.

(ii) Find the correct GMT date and time. On 2nd March PM at ship in DR 16°12'N 092° 10'E chron time 00h 30m 12s and error 02m 06s slow.

Or

(b) (i) What is the relationship between true altitude and true zenith distance? Explain.

(ii) Find the deviation from the following : True Azimuth : 231.5°(T) Compass Azimuth: 230.0°(C) Variation : 1.5°W.

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

Answer **all** questions.

16. (a) On 1st May 2008, in DR 30° 06' N 179° 45'W, the setting sun bore 285°(C). If the variation is 2 W, find the deviation of the ship's head.

Or

(b) On 23rd Aug. 2008, in DR 40°02' S 173° 18'E, the Moon set bearing 287.0°(C). If the variation is 13.0°E, find the deviation of the ship's head.

17. (a) On 28th April 2008 in DR 25°20'N 75° 00'E, the sextant meridian altitude of the Moon's LL was 42°05.8', if IE=1.5' off the arc and HE=25m, calculate the latitude and LOP.

Or

(b) On 23rd Sept. 2008, in DR 23° 40'N 161° 56'E, the sextant meridian altitude of the sun's LL was 66° 10.6'. If IE=2.3' on the arc and HE=10.5m, Find the latitude and the LOP.

18. (a) Explain the process of position fixing by Intercept method.

Or

(b) What is Marine Sextant? Explain the working principle of Sextant with an aid of neat diagram.

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C–1513

Sub. Code
11642

B.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Nautical Science

CARGO HANDLING AND STOWAGE — II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Explain any three features of Container Ship.

2. Define TEU and FEU.

3. What is Slop tank and what is its use?

4. What is meant by Spontaneous Combustion?

5. What are the precautions to be taken for deck machinery from dust?

6. What are the classifications of cargo as per IMSBC Code?

7. Define Grain cargo carrier?

8. Explain :
   (a) BLU Code
   (b) IMBSC Code

9. What is Threshold Limit Value?

10. What is COW?

Part B (5 × 5 = 25)

Answer **all** the questions.

11. (a) Explain about stowage and Securing gear of containers ship.

Or

(b) Classify the bulk carrier with respect to its size and carrying products.

12. (a) What are the hazards associated with the bulk cargoes?

Or

(b) Explain the procedure of Pre-loading Inspections for cargo loading.

13. (a) Describe the method of separation of different grain cargoes to be loaded in the same compartment.

Or

(b) Explain Cargo piping system in oil tankers.

14. (a) Express in details about pump room entry precautions checklist.

Or

(b) Discuss the stripping of pump while cargo handling in tanker ship.

15. (a) Enumerate Grain loading stability criteria for ships.

Or

(b) What are the precautions to be taken while loading high density cargoes?

Part C (3 × 10 = 30)

Answer **all** the questions.

16. (a) (i) How do the cargoes preserved and carried in Reefer Container?

(ii) State the procedure of segregation and carriage of dangerous goods in containers.

Or

(b) Explain the procedure of preparing the cargo space of a tanker ship.

17. (a) What is COW? And explain briefly about it with neat diagram.

Or

(b) Explain the Fixed gas monitoring system with neat diagram.

18. (a) Explain the following :

(i) DB Tank

(ii) Pump room

(iii) Wing tanks

(iv) Corrugated Bulkhead

(v) Deep Tanks

Or

(b) Explain Cargo piping system with neat diagram :

(i) Free flow system

(ii) Ring main system

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C–1514	Sub. Code
	11643

B.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Nautical Science

MARINE ENGINEERING AND CONTROL SYSTEMS — II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. Name two types of fuel oils used in a motor vessel.

2. What is the function of a windlass in ships?

3. C.I. and S.I. Engines expand.

4. Where do the bilges located in Engine room?

5. Name two types of turbines.

6. State whether the sea water cooling is closed or open system.

7. Where is the fly wheel located in the engine?

8. What is the function of a oily water separator?

9. Expand MCR with respect to engines.

10. Where is turbo charger located in the engine?

Part B (5 × 5 = 25)

Answer **all** the questions.

11. (a) Describe treatment carried out on heavy fuel oil prior to its injection to the fuel pump.

Or

(b) Briefly describe the functioning of a Mooring winch.

12. (a) Name the types of scavenging in a two-stroke Marine engine.

Or

(b) How will you calculate the propeller slip?

13. (a) Specify the permissible limits of oily water discharge into sea.

Or

(b) List the various maneuvering aids required while a ship is entering or leaving port.

14. (a) What is the function of a Flywheel and thrust block in the transmission shaft?

Or

(b) Briefly describe the functioning of a impulse stream turbine.

15. (a) Distinguish between the functioning of a diesel and petrol engines.

Or

(b) Draw the heat balance chart for diesel engines and label the parts.

Part C

(3 × 10 = 30)

Answer **all** the questions.

16. (a) Sketch and describe the working principle and priming system of centrifugal pumps.

Or

(b) With a line sketch describe the functioning of a biological sewage treatment plant.

17. (a) With a sketch describe a uni flow scavenging system in two stroke Marine propulsion engine.

Or

(b) With a line sketch describe a lubricating oil system of a two stroke Marine propulsion engine.

18. (a) With a line diagram trace a jacket cooling water system of a two stroke marine engine.

Or

(b) Describe briefly how does scavenge fire occur in two stroke Marine engine. What are the steps to be taken to prevent scavenge fire?

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C–1515	Sub. Code
	11644

B.Sc. DEGREE EXAMINATION, APRIL 2024

Fourth Semester

Nautical Science

VOYAGE PLANNING AND COLLISION PREVENTION — II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Notes : (1) Draw diagram where ever applicable.

(2) Use of 1992 Tide tables are allowed.

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define the term "Side Light".
2. Define the term "Stern Light".
3. What is the day signal for a "Dredger V/L At Anchor"?
4. Name any four nautical publications.
5. What is the meaning of "Courtesy Flag"?
6. What do you understand by the term "Land Fall".
7. Draw and write short notes on "Depth Contours".
8. What do you understand by the terms "High Water And Low Water"?
9. Explain the terms:
   (a) Short blast
   (b) Prolonged blast.

10. With respect to Rule No.34, what is the meaning of the following terms:

(a) One short blast

(b) Two short blasts

(c) Three short blasts.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Give the symbols / abbreviation for the following :

(i) Pilot Station

(ii) Racon D

(iii) Depth contour 30m

(iv) Wreck non dangerous for surface Navigation

(v) Oil platform with light

Or

(b) Give the symbol / abbreviation for the following :

(i) Fishing prohibited area

(ii) Light vessel

(iii) Rock awash at chart datum

(iv) Oil and gas pipe line

(v) Disused submarine cables.

12. (a) What information you will get from "Mariner's Hand Book"?

Or

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

13. (a) What are the information you will get from "Guide To Port Entry"?

Or

(b) What is the information you will get from "Ship's Routing Chart"?

14. (a) (i) What is the meaning of "Q" flag, "H" flag and "G" flags?

(ii) What are the flags flown when a foreign v/l is entering into Indian Port and by using which Mast?

Or

(b) Explain the "list of radio signals".

15. (a) What are the factors a Master will take into account while selecting a "Suitable Anchorage"?

Or

(b) What is a 'Coastal Chart"?. What are the information you will get from coastal charts?

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) As per Rule No.34, what are sound signals for the following :

(i) Power driven vessel "Under way"

(ii) Power driven vessel "Making way"

(iii) Power drivel vessel more than 100m in length at "Anchor".

(iv) Power driven vessel more than 100m in length Aground.

Or

(b) (i) What are the day and night signals of a power drivel vessel engaged in towing and the length of the tow is more than 200m in length will exhibit?.

(ii) What are the day and night signals for a pilot v/l engaged in "Pilotage operations at anchor" will exhibit?

17. (a) What are the distress signals as per rule No.37?

Or

(b) (i) What are the "Day And Night Signals" A Dredger Engaged In Dreding Operation and is with Obstruction will exhibit?

(ii) What are the fog signals for a vessel of more than 100 mtrs in length?

(1) At Anchor

(2) Aground

18. (a) Find the height of the tide at Darwin (Australia) at 1805 hrs. Standard Time on 20th January. The extracts from the Tide tables are given below :

Extract from ATT

Time	Height
0250	2.0M
0830	6.6M
1436	1.2M
2105	7.5M

Or

(b) Find the height of tide at 1930 hrs. Standard time on 4th February at Darwin. Extract from the tide tables for the day under reference are as under :

Extract from ATT

Time	Height
0312	1.7M
0904	6.5M
1502	1.9M
2112	6.9M

C–1516	Sub. Code
	11645

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Fourth Semester

Nautical Science

NAVAL ARCHITECTURE – III

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Specify the process of Edge preparation before joining in dissimilar metals.

2. What are porous holes in welding?

3. Where will be the position of centre of pressure of a upside–down triangular cross–section ship.

4. What are docking blocks?

5. What is Air draught?

6. Device the permeability percentage for machinery space.

7. Describe the term about Launching.

8. Why do sea trials are carried out?

9. Specify the requirement of load line regulation.

10. What are fire doors?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) State the use of Lines plan in ship fabrication shop.

Or

(b) Enlist the drawings required to be referred in pre fabrication shop.

12. (a) How will you carry out welding on ferrous and non-ferrous metals?

Or

(b) What are NDT? Describe the various NDT tests.

13. (a) State the Statutory regulations to be followed while constructing General cargo ship.

Or

(b) Explain the structural fire protection arrangements of cargo ships.

14. (a) What is writing moment influence on ship's stability? Explain with diagram.

Or

(b) A ship of 10000 tonne displacement has a mass of 500 tonne on forepeak at 110 m forward of mid-ship. Calculate the shift in centre of gravity of the ship if the mass is moved to a position of 14 m forward of mid-ship.

15. (a) A ship of 10000 tonne displacement, 250 m long floats at a draught of 7.3 m. Calculate the wetted surface area of the ship.

Or

(b) Distinguish the difference between Stiff and Tender conditions of ship with an aid of neat diagram.

Part C

(3 × 10 = 30)

Answer **all** questions.

16. (a) What is angle of Loll? Derive the equation for angle of Loll.

Or

(b) A ship of 250 long. COF 3.1 m aft of mid-ship, MCTIC 85 tonne floats at 6.6 m fwd and 9.5 m aft. Find the new draught, if the 700 tonne is discharged from a position of 80 m abaft of mid-ship.

17. (a) Explain stability and trim calculation during dry-docking.

Or

(b) Discuss the roles of the classification society in shipping industry.

18. (a) Write short notes with suitable diagram on:

(i) Metacenter

(ii) Metacentric height

(iii) Centre of Floation

(iv) Centre of Buoyancy

Or

(b) With an aid of neat sketch explain sub divisional load lines on passenger ship.

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C–1517	Sub. Code 11646

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Fourth Semester

Nautical Science

NAVIGATION – III

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What are the disadvantages of laying GC track?

2. What is vertex of a GC?

3. What is Annular solar eclipse?

4. What is Liberation of moon?

5. What are messages received by Navtex?

6. What is the use of ARPA?

7. What is the LHA of a body when crossing the observers meridian?

8. Why Ex meridian is used for navigation?

9. What is the use of a course recorder?

10. How does AIS help in tracking of a ship?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Why a composite great circle is needed?

Or

(b) What is precession of Gyro compass and what is its relation to the applied force?

12. (a) Briefly describe the three segments of GPS system.

Or

(b) Briefly describe errors of GPS.

13. (a) What is bearing discrimination and range discrimination of a RADAR?

Or

(b) What is spoking and starring of a Radar? What are the causes?

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

Or

(b) How do you calculate latitude by observing POLARIS?

15. (a) What are the uses of VDR?

Or

(b) What are the uses of AIS?

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Find initial course, final course and distance along GC track from A 51°20'N 010°00'E to B 52°00'N, 055°00'E?

Or

(b) Explain with neat sketch the working principle of Echo sounder?

17. (a) Explain in detail the cause of SOLAR ECLIPSE and conditions necessary with a neat sketch.

Or

(b) Explain with neat diagram the various phases of moon? What is the age of a moon?

18. (a) What are the care and checks you carry out in a course recorder?

Or

(b) Explain the various controls and various errors of an Echo sounder?

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C–1518	Sub. Code
	11651

B.Sc. DEGREE EXAMINATION, APRIL 2024

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. List few Lashing materials used to secure timber cargo.
2. Explain the term “Dangerous Goods”.
3. Describe TLV.
4. Write a short notes on Boiling point.
5. What do you understand about “Inter barrier space”?
6. Tell us about “Hazardous”.
7. What are the limitations on carrying dangerous cargoes?
8. How will you dealt with “Third party damage”?
9. What are the contents in the cargo manifest?
10. Write briefly on “Deep well pump”.

Part B (5 × 5 = 25)

Answer **all** the questions.

11. (a) Discuss the hazards involved with carriage of Timber deck cargo.

Or

(b) How will the "Rolling period Test" conducted to determined the stability of the vessel?

12. (a) Explain the following terms involved with IMDG code

(i) MFAG

(ii) EMS

Or

(b) What are the entries to be made in "Cargo Record Book"?

13. (a) Explain different types of Tanker vessels.

Or

(b) What is the purpose of IBC code?

14. (a) Discuss about the distinctive lables on IMDG cargoes.

Or

(b) What are the precautions to be taken during stowage, handling and loading of explosives?

15. (a) Discuss about different kinds of Charterer's party.

Or

(b) Write brief notes on :

(i) General Index

(ii) Dangerous Cargo Manifest.

Part C (3 × 10 = 30)

Answer **all** the questions.

16. (a) What is your understanding on the following:

(i) Mate's Receipt

(ii) Bill of lading

Or

(b) Explain the following terms:

(i) Note of protest

(ii) Third party damage

17. (a) List out the precautions to be taken when handling "Heavy Lifts".

Or

(b) Discuss about various segregation methods of stowing Non-computable cargoes.

18. (a) How many tonnes of cotton sales would fit in a cargo hold of 12 × 9 × 3.5 m. Given stowage factor is 1.61 μ 3/t and Broken stowage is 6%.

Or

(b) 50 tonnes of General cargo is to be loaded in to space containing 6000 cubic feet with stowage factor of 40 cubic feet per tonne with the Broken Stowage 5% loaded. What is the space remaining?

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C–1519	Sub. Code
	11661

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Nautical Science

MARINE ENVIRONMENTAL PROTECTION

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** the questions.

1. What do you understand about MARPOL 73178?

2. Write a short notes on "CLEAN WATER ACT".

3. Describe the word "SWDGE".

4. What are the entries made in OIL RECORD BOOK–PART–II?

5. Explain the functions of "oily water separator".

6. Discuss about "IOPP" certificate.

7. What do you know about "Volatile Organic Compound"?

8. What is the use of Incinerator?

9. Write short notes on "Ballast water management".

10. Discuss about Global warming in short.

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

Answer **all** the questions.

11. (a) What are the Annexes of MARPOL 73178?

Or

(b) Describe the role of pert state control Inspectors?

12. (a) Write a notes on "National pollutant discharge Elimination system (NPDES).

Or

(b) What are the special areas in relation with MARPOL Annex-I?

13. (a) Explain how to maintain "Cargo Record Book" and What are the entries to be made in it?

Or

(b) What do you know about Identification of Harmful substances in packaged form?

14. (a) As per IMDG, Give the details on "Quantity Limitations" and "Exceptions".

Or

(b) Write the conditions on "Sewage Discharge" as per MARPOL 73178.

15. (a) What are the entries to be made in "Garbage Record Book"?

Or

(b) Discuss about "Anti fueling paint pollution".

Part C (3 × 10 = 30)

Answer **all** the questions.

16. (a) Explain the different types of surveys conducted on board a ship and the validity of the certificates.

Or

(b) Explain OPA-90 in detail.

17. (a) Explain how Ballast water Treated on vessels in accordance with MARPOL.

Or

(b) Briefly explain the following terms.

(i) Oil record book

(ii) SOPEP

18. (a) Write the complete details about the following.

Packing, marking and labeling of IMDG cargo.

Or

(b) Describe Garbage reception facility and its requirements.

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C–1520	Sub. Code 11662

B.Sc. DEGREE EXAMINATION, APRIL 2024.

Sixth Semester

Nautical Science

SEAMANSHIP PRACTICES

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. How many kinds of ropes are used on board ship?

2. What is “strand”? In how many ways can it be laid up to make a rope?

3. What is “Cathodic protection?

4. How will you protect the Hull surface from corrosion?

5. Describe the term “Veer cable”.

6. What is the purpose of “cable stopper?

7. State the “Man overboard alarm”.

8. Enumerate types of Rudders.

9. What are Pilot ladders?

10. State the effect of List on ship’s stability.

Part B (5 × 5 = 25)

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

11. (a) Write down the care and maintenance of Natural ropes.

Or

(b) Discuss the process of preparing the surface for painting.

12. (a) What is Mooring and how many ropes are used for mooring a ship along side of a Wharf?

Or

(b) Discuss the process of preparing of Anchor for lowering at sea.

13. (a) State the process of preparing ship for Dry docking.

Or

(b) Name the types of Portable extinguishers used on board ship and their uses.

14. (a) Express the maintenance carried out for portable fire extinguishers.

Or

(b) Draw the diagram of Kenter shackle and mention its uses.

15. (a) What is Bosun chair? How will you rig it?

Or

(b) How will you measure the depth of sea by using Hand Lead Line and give few examples of callout soundings.

Part C

(3 × 10 = 30)

Answer **all** questions.

16. (a) With neat diagram discuss the process anchoring of ship.

Or

(b) Write down the works carried out during the dry dock.

17. (a) Write about the marking of Anchor & chain cable.

Or

(b) Discuss the types of boat davits and their operation used in Merchant navy.

18. (a) Explain the launching process of Life boat at sea.

Or

(b) With help of neat diagram explain the process of securing a ship to two buoys in a very strong wind.

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C–1521	Sub. Code 11663

B.Sc. DEGREE EXAMINATION, APRIL 2024

Sixth Semester

Nautical Science

CONVENTIONS AND REGULATIONS

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. What is tacit acceptance?
2. What is the function of ILO?
3. What is segregated ballast?
4. Define EEZ in UNCLOS.
5. What is ISPS code?
6. What is ISM and SMS?
7. Define MSC and MEPC.
8. Define continental shelf.
9. State two search patterns as per IAMSAR manual.
10. What SMPEP manual and what is its use onboard a ship?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) How will you manage the garbage produced on board ship. Explain segregation and disposal?

Or

(b) What is the discharge criteria of engine room bilges as per MARPOL?

12. (a) Write short notes on contents of STCW code.

Or

(b) Write short notes on COLREG.

13. (a) Define GRT, SDWT, NRT, freeboard as per load line convention.

Or

(b) What are the duties of SSO, CSO and PFSO as per ISPS code?

14. (a) Define (i) territorial waters (ii) high seas (iii) right to innocent passage (iv) flag state (v) hot pursuit.

Or

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

15. (a) Define MLC and DMLC.

Or

(b) State work rest hours as mandated by STCW code.

Part C (3 × 10 = 30)

Answer **all** questions.

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

Or

(b) Enumerate special areas as per

(i) Annex 1 of MARPOL

(ii) Annex 2 of MARPOL

(iii) Annex 5 of MARPOL.

17. (a) Explain the functions and the structure of IMO and its various committees.

Or

(b) Describe different levels of security as per ISPS code and enumerate the contents of ship security plan.

18. (a) Define

(i) IOPP certificate

(ii) DOC certificate

(iii) SMC certificate

(iv) Persistent oil

(v) PPM

(vi) Load line mark

(vii) Summer draft

(viii) Oil record book

(ix) SBT

(X) ODMCS.

Or

(b) Explain in detail the IMDG code and its contents (including supplements).

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C–1522	Sub. Code 11664

B.Sc. DEGREE EXAMINATION, APRIL 2024.

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 Quasi contract?

2. State the role of Shipping Master.

3. State Hague Visby rule.

4. Express Charter party.

5. Describe Wreck with respect to Marine Insurance.

6. What do you understand by the term liens?

7. Describe Breach of contract.

8. What is the minimum age limit to become a Seaman?

9. State role of Director General of Shipping in India.

10. What is the purpose of MLH Act?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Distinguish between Public and Private law.

Or

(b) What are the sources of Maritime Law?

12. (a) Explain process of taking care of a deceased seaman according to M.S. Aet 1958.

Or

(b) Discuss about Article of agreement.

13. (a) What is Hague Visby rule? When and where is this rule applicable in Maritime industry?

Or

(b) Write short notes on Multimodal transportation.

14. (a) Express the Indian Arbitration Act 1966.

Or

(b) What safety measures are to be taught to the crew during STSDSD course?

15. (a) Describe the General legal remedies as given in specific relief act.

Or

(b) State the risks covered under H and M insurance.

Part C

(3 × 10 = 30)

Answer **all** questions.

16. (a) How do the Ships are registered in India. Explain in detail.

Or

(b) What is Official log book? Enlist the entries made on it.

17. (a) Write about the following:

(i) General average (ii) Particular average.

Or

(b) Discuss the Engagement and Discharge of seamen in India.

18. (a) What are P and I clubs? How are they operated? Explain the risks covered under these clubs.

Or

(b) What is ISPS Code? Explain in detail.

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C–1523	Sub. Code 11665

B.Sc. DEGREE EXAMINATION, APRIL 2024

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. What is the use of barograph?

2. Which are the sources of meteorological data?

3. Define scattering and its types.

4. Define cold and worm front and draw the symbols of cold and work front.

5. Define TRS and local names associated with it.

6. A short note on Stevenson's screen.

7. Which are the sources of meteorological data?

8. Define climatological routing.

9. State the ideal conditions for the formation of a TRS.

10. Define occluded front.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Describe the vertical distribution of ocean water temperature.

Or

(b) Give a note on ship's weather code.

12. (a) Describe about Radiation Law's.

Or

(b) Describe the types of air mass.

13. (a) Describe the procedures in recording and reporting of weather.

Or

(b) Briefly explain the origin and movement of a TRS.

14. (a) Describe the major types of clouds.

Or

(b) Give a note on Beufort scale.

15. (a) Give a note on International System of weather reporting.

Or

(b) Write a note on Indian Monsoon.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain the actions to be taken when the presence of a TRS.

Or

(b) Describe the influencing factors of weather routing and its advantages.

17. (a) Describe the energy interaction with earth's atmosphere.

Or

(b) Describe the causes and effects of global warming.

18. (a) Define Air mass and describe the classification and properties of air masses.

Or

(b) Decode the following ship's weather messages by using "Ship's weather code".

BBXX VPUB 29063 99107 10638 41398

53606 10163 49998 70266 84233 22211

———————

C–1524

Sub. Code
11666

B.Sc. DEGREE EXAMINATION, APRIL 2024

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 deviation?

2. Define coefficient C.

3. Write down the marine radar frequencies used in merchant ships.

4. What is selective availability in GPS?

5. Define AIS and its uses.

6. Define SART.

7. Why variation is not constant over a period of time at any place on earth?

8. What is the use of Echo sounder in navigation?

9. What is RACON?

10. What is ARPA and enumerate its uses?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What is induced coefficient B?

Or

(b) What is reason for compass error?

12. (a) How radar can be used as a collision avoidance tool on board the ship?

Or

(b) Explain the controls of a marine radar.

13. (a) Describe working principle of SART.

Or

(b) Explain how EPIRB can be used in emergency situation.

14. (a) Explain working principle of DGPS.

Or

(b) Explain working of COSPAS-SARSAT system.

15. (a) What are the information stored in VDR system in any emergency situation?

Or

(b) Explain phasing in Echo Sounder.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain various segments of GPS with the help of block diagram.

Or

(b) Explain the various functions of AIS and its working principle.

17. (a) Explain working principle of an Echo sounder with the help of diagram.

Or

(b) Explain the errors affecting performance and accuracy of working of Echo sounder.

18. (a) While swinging the strips compass the following bearings of a planet was observed. Find variation, coefficient B, Coefficient C?

Comp Co	N	NE	E	SE	S	SW	W	NW
Comp Brg	069°	064°	064°	065°	063°	063.5°	071°	077°
True Brg	075°	075.5°	076°	076.5°	077°	078°	079°	079.5°

Or

(b) Calculate value of coefficient A if following deviations were known to exist.

Comp Hdg	N	NE	E	SE	S	SW	W	NW
Deviation	8°E	3°E	2°W	5°W	1°W	5°E	2°E	1°W

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C–2318

Sub. Code
11613

B.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Nautical Science

BASIC SHIP KNOWLEDGE

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. Modern ports are made to enhance
   (a) Port Facility
   (b) Security
   (c) Building new ships
   (d) None of the above

2. Container ship is having
   (a) Single deck (b) Two decks
   (c) Three decks (d) Four decks

3. Camber is provided for the drainage of
   (a) Upper deck water
   (b) Below deck water
   (c) Fuel oil
   (d) None of the above

4. The Bow thruster is used for

(a) Controlling ship's movement at harbour

(b) Measure water level

(c) Measure Tank level

(d) None of the above

5. General Service pump can be used for

(a) Fire fighting purpose

(b) Bunkering

(c) Transferring Lube oil

(d) Transferring Fresh water

6. Decks are marked with

(a) Numbers (b) Alphabets

(c) Alpha-numerics (d) None of the above

7. Cofferdams are used for

(a) Stowage of water

(b) Stowage of Cargo

(c) Stowage of contaminated liquids

(d) Stowage of all Fresh water

8. The Main Control Room onboard ship is called as

(a) Wheel house (b) Poop deck

(c) Forepeak (d) Rose box

9. Duct keels are provided in

(a) Tanker ship (b) Container ship

(c) Passenger ship (d) Barges

10. Ship's speed in measured in

(a) Nautical mile (b) Kilometers

(c) Meters (d) None of the above

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

Answer **all** questions.

11. (a) Explain the existence of old harbours.

Or

(b) Describe hydrographic vessels.

12. (a) State the roles of Offshore vessels.

Or

(b) Draw the Mid-ship section diagram of general cargo ship.

13. (a) Enumerate any five deck equipment.

Or

(b) Explain the purpose and location of Slop tanks.

14. (a) Describe the layout of fore peak arrangement.

Or

(b) What are Hatches and label the parts with neat diagram.

15. (a) Describe the purpose of Pantry on board ship.

Or

(b) What is Shell expansion drawing? How does it useful during Dry-Docking?

Section C (5 × 8 = 40)

Answer **all** questions.

16. (a) Explain the development of Ocean going merchant vessel.

Or

(b) Explaining the following :

(i) Draught

(ii) Flare

(iii) Duct keel

(iv) Weather deck

(v) Transom.

17. (a) Explain the Plimsol Load line marking with neat sketches.

Or

(b) Discuss the process of Anchoring of ship near to port.

18. (a) Enlist any eight Geographical features which are affecting shipping operation.

Or

(b) Draw the neat diagram of deck plating and label the various strakes.

19. (a) Sketch and explain the draught markings of a merchant vessel.

Or

(b) Explain the layout of Engine room with neat diagram.

20. (a) Draw the mooring diagram of a tanker ship and label the parts.

Or

(b) Draw the profile view of Bulk carrier ship and label the parts.

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C–2319	Sub. Code
	11614

B.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Nautical Science

NAVIGATION — I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Section 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. The quadrantal from of course 190° is _____

   (a) S10°W (b) S10°E

   (c) S10°N (d) None

4. The start and final position of plane sailing is limited and does not exceed _____

   (a) 500 NM (b) 600 NM

   (c) 700 NM (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. ———————— canal connects atlantic and pacific oceans

(a) Panama canal (b) Neil

(c) Panama ocean (d) None

8. In a mercator projection the ———————— scale appears to be same over the entire chart

(a) Longitude (b) Latitude

(c) Pole (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

Section B (5 × 5 = 25)

Answer **all** questions.

11. (a) Explain (i) Earth poles (ii) equator and (iii) Meridians.

Or

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

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

Or

(b) Describe the direction of the ships head on gyro compass.

13. (a) Calculate the distance between two positions on the same parallel of latitude.

Or

(b) Demonstrate the uses of plane sailing formulae.

14. (a) Explain the basic knowledge of chart projection.

Or

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

15. (a) Explain the principles of Gnomonic projection.

Or

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

Section C (5 × 8 = 40)

Answer **all** questions.

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

Or

(b) Describe the earth as an ellipsoid.

17. (a) Describe the directions of the ship head on the magnetic compass.

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 after sailing along a parallel of latitude.

Or

(b) Derive the plane sailing formulae.

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

Or

(b) Explain how to measure the distance between two positions on a mercator chart based on the latitude of the two positions.

20. (a) Explain the procedure to transfer a great circle from a gnomonic chart to a mercater chart.

Or

(b) Explain the principles and uses of Gnomonic chart.

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C–2320	Sub. Code
	11615

B.Sc. DEGREE EXAMINATION, APRIL 2024

First Semester

Nautical Science

NAUTICAL MATHEMATICS – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. All great circles which pass through North pole and south pole are called the ————————

   (a) Colatitude (b) Meridians

   (c) Longitude (d) Equator

2. If one of the angles of a spherical triangle is 90°, it is called a ————————

   (a) right angled triangle

   (b) quadrantal triangle

   (c) adjacent

   (d) None

3. When a plane cuts a sphere the section this formed is called ————————

   (a) a small circle (b) a diameter

   (c) a circle (d) None

4. Find the double derivative of $y = x^3$

(a) $3x$ (b) $4x$

(c) $5x$ (d) $6x$

5. If $y = 5 \ cos\ x$ -3 $sin\ x$, then $\frac{d^2y}{dx^2}$ is equal to

(a) $-y$ (b) y

(c) $25y$ (d) $9y$

6. What is $\frac{\cos\theta}{1+\sin\theta} + \frac{1}{\cot\theta}$ equal to?

(a) cosec θ (b) sec θ

(c) sec θ + cosec θ (d) None

7. Which of the following is not a definition of Gamma functions?

(a) $\sqrt{(n)} = n!$

(b) $\sqrt{(n)} = \int_0^\infty x^{n-1} e^{-x}\ dx$

(c) $\sqrt{(n+1)} = n\sqrt{(n)}$

(d) $\sqrt{(n} = \int_0^1 \log\left(\frac{1}{y}\right)^{n-1}$

8. A square matrix A is said to be singular if

(a) $|A| = 0$ (b) $|A| \neq 0$

(c) $|A| = 1$ (d) None

9. Find the rank of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & -2 & 1 \\ 1 & 0 & 5 \end{bmatrix}$

(a) 3 (b) 1

(c) 2 (d) 0

10. The eigen values of the matrix $\begin{bmatrix} \cos\alpha & \sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$

(a) $\pm\cos\alpha$

(b) $\pm\sin\alpha$

(c) tan α and cot α

(d) $\cos\alpha \pm \sin\alpha$

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

Answer **all** questions.

11. (a) In a spherical triangle *ABC*, show that $\sin 2B + \sin 2C = 0$ when $b + c = \pi$

Or

(b) In a spherical triangle *ABC*, $A = 88° 24.5'$, $a = 87° 01'$, $C = 100° 09'$, $b = 98° 10'$, find *B*.

12. (a) *ABC* in a spherical triangle in which $A = 90°$, $B = 120°$ $C = 60°$, find *a,b,c* using Napier's rule.

Or

(b) Derive the Haversine formula.

13. (a) Verify Euler's theorem for the function

$f = x^3 + 2x^2y + 3xy^2 + y^3$

Or

(b) If $x = \tan(\log y)$ prove that $(1+x^2)\, y_{n+1} + (2_{nx-1})$ $y_n + n(n-1)\, y_{n-1} = 0$ using Leibritz's theorem.

14. (a) Prove that the following

(i) $\Gamma_{(n+1)} = n\,\Gamma_{(n)}$

(ii) $\Gamma_{(n+1)} = n!$ where n is a positive integer.

Or

(b) Change the order of Integration in

$I = \int_1^2 \int_3^4 f(x,y)\, dy\, dx$.

15. (a) Find the rank of a matrix $A = \begin{pmatrix} 3 & -1 & 2 \\ 0 & 1 & -3 \\ 6 & -1 & 1 \end{pmatrix}$.

Or

(b) Find the characteristic roots of the matrix

$A = \begin{pmatrix} \cos\theta & -\sin\theta \\ -\sin\theta & \cos\theta \end{pmatrix}$

Part C (5 × 8 = 40)

Answer **all** questions.

16. (a) Derive Napier's Rules.

Or

(b) Show that in any spherical triangle ABC.

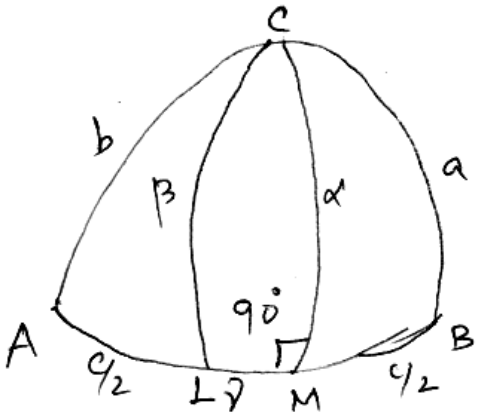
$\frac{\sin(A+B)}{\sin c} = \frac{\cos a + \cos b}{1+\cos c}$. If a and b are complementary, then deduce that $(\cos b + \sin b)\sin c = 2\cos^2 c/2 \ \sin(A+B)$.

17. (a) In a spherical triangle ABC, given $c = 100^\circ 09'$ $A = 88^\circ 24.5'$, $B = 97^\circ 46'$ calculate the third angle C.

Or

(b) In a spherical triangle ABC, α, β be the arcs drawn form right angle C respectively perpendicular to and bisecting the hypotenuse C. show that

$\sin^2 \frac{c}{2}\left(1+\sin n^2\alpha\right) = \sin^2 \beta$



18. (a) If $u = log\left(x^3 + y^3 + z^3 - 3xyz\right)$ show that

$$\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = \frac{3}{x + y + z}$$

Or

(b) Find the gradients of the following scalar functions

(i) $2x^2 + y^2 + z^2$

(ii) xyz.

19. (a) Evaluate $\iint x^2 + y^2 \, dx\, dy$ Where D is the circular disc $x^2 + y^2 \leq 1$.

Or

(b) Prove that

(i) $\sqrt{(1)} = 1$

(ii) $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$

20. (a) Find the eigen values and eigen vectors of the matrix $A = \begin{pmatrix} 3 & 0 & 0 \\ 5 & 4 & 0 \\ 3 & 6 & 1 \end{pmatrix}$.

Or

(b) Solve the following homogeneous operations

$x + 2y + 3z = 0;\ 2x + y + 3z = 0;\ 3x + 2y + z = 0$.

———————