C–0014	Sub. Code
	11613

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. What are vectors?

2. Define Scalar.

3. Find the equation of normal to the parabola $x^2 = 9y$ at $(-4,1)$.

4. Express Hyperbola.

5. State properties of right-angled spherical triangle.

6. Evaluate $\int \sqrt{x^2 + y^2}\, dx$.

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

8. Find the derivative of $y = \log(\cos x)$.

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

10. What are Consistent?

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

Answer **all** questions.

11. (a) A continuous random variable has a pdf $f(x)=3x^2, 0\le x\le 1$. Find a and b such that

(i) $p(x\le a)=p(x>a)$ and

(ii) $p(x>b)=0.05$

Or

(b) Explain linear regression, methods of least squares.

12. (a) Find the volume of a sphere.

Or

(b) Find the equation of the parabola if the vertex is (8,3) and the focus is, (5, -2)

13. (a) In a spherical triangle ABC,C is right angle, prove that $\sin^2 1/2\, c=\sin^2 1/2\, a$

$\cos^2 1/2b+\cos^2 1/2a\sin^2 1/2b$.

Or

(b) In a spherical triangle ABC, derive

$$\frac{SinA}{Sina}+\frac{SinB}{Sinb}+\frac{SinC}{Sinc}$$

14. (a) Evaluate $\int \frac{dx}{a^2 - b^2}$

Or

(b) If $\sin y = x \sin(a + y)$, prove $\frac{dx}{dy} = \frac{\sin^2(a+y)}{Sin\, a}$

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

Or

(b) Verify the matrix $A = \begin{vmatrix} 2 & -2 & 2 \\ -2 & 1 & 2 \\ 1 & 1 & -2 \end{vmatrix}$ satisfies its characteristic equation.

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

Answer **all** questions.

16. (a) Find the equation of the sphere passing through the points (2,2,-4) and (1,-1,2) and having its centre on the live $x + y - z - 2 = 0,\ 2x - y + z - 2$

Or

(b) Find the correlation coefficient between X and Y from the following data.

X :	65	54	45	55	67	69	57	71
Y :	115	124	137	121	109	142	123	107

17. (a) Evaluate $\int_0^{\pi/2} \log \sin x \, dx$

Or

(b) Given c= 69°25', A=54°55', C = 90°. solve the triangle

18. (a) Diagonalize the matrix $\begin{vmatrix} -1 & 2 & 1 \\ -2 & 1 & -2 \\ 1 & -1 & -1 \end{vmatrix}$ by means of an orthogonal transformation.

Or

(b) Verify Cayley - Hamilton theorem for the matrix $\begin{vmatrix} 3 & 0 & 2 \\ -2 & 2 & -2 \\ -4 & -2 & -5 \end{vmatrix}$

C–0018	Sub. Code
	11623

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. Find the modulus of $1 - \cos\theta + i\sin\theta$.

2. Find the real and imaginary parts of $\cos(x + iy)$.

3. What is the order of error in the Trapezoidal rule?

4. Write Simpson's 3/8th rule.

5. Define irrotational vector.

6. If $Q = xyz$, find Grad ϕ.

7. Eliminate c from $y = cx + c - c^3$.

8. Solve: $\frac{dy}{dx} = e^{3x-2y} + x^2 e^{-2y}$.

9. Define Simple Harmonic Motion.

10. Find the particular integral of $(D^2 + 2D + 2)x = 5$.

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

Answer **all** questions.

11. (a) Simplify: $\dfrac{(\cos 5\theta - i\sin 5\theta)^2(\cos 7\theta + i\sin 7\theta)^{-3}}{(\cos 4\theta - i\sin 4\theta)^9(\cos\theta + i\sin\theta)^5}$

Or

(b) Prove that $\cos 2z = 2\cos^2 z - 1$.

12. (a) Find the first derivatives of the function tabulated below at the point $x = 1.5$.

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.0	13.625	24.0	38.875	59.0

Or

(b) Compute the value of the definite integral $\int_4^{5.2} Inx\,dx$ using Simpson's $\dfrac{1}{3}$ rule.

13. (a) If $\vec{F} = (3x^2 + 6y)i - 14yz\hat{j} + 20xz^2\hat{k}$, evaluate $\int_c \vec{F}.dr$ from (0,0,0) to (1,1,1) along the curve $x = t$, $y = t^2$, $z = t^3$.

Or

(b) Find the unit normal vector to the surface $x^2y + 2xz^2 = 8$ at the point (1,0,2).

14. (a) Solve: $(x+1)\dfrac{dy}{dx} - y = e^{3x}(x+1)^2$

Or

(b) Solve: $\dfrac{dy}{dx} = \sin(x+y) + \cos(x+y)$

15. (a) Solve: $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = (1 - e^x)^2$

Or

(b) Solve: $(D^2 + 9)y = x^2$

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

Answer **all** questions.

16. (a) State and prove De-Movire's theorem.

Or

(b) If $u = \log\tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right)$, prove that (i) $\tan h\frac{u}{2} = \tan\frac{\theta}{2}$,

(ii) $\theta = -i\log\tan\left(\frac{\pi}{4} + \frac{iu}{2}\right)$.

17. (a) The velocity V of a particle at distances from a point on its path is given by the table.

S	0	10	20	30	40	50	60	feet
V	47	58	64	65	61	52	38	feet/sec

Estimate the time taken to travel 60 feet by using Simpson's one – third rule. Compare the result with Simpson's $\frac{3}{8}$ rule.

Or

(b) Apply Green's theorem $\int_c (2x^2 - y^2)dx + (x^2 + y^2)dy$ where C is the boundary of the area enclosed by x–axis and upper half of the circle $x^2 + y^2 = a^2$.

18. (a) Solve (i) $(x^2y - 2xy^2)dx - (x^3 - 3x^2y)dy = 0$

(ii) $(xy^3 + y)dx + 2(x^2y^2 + x + y^4)dy = 0$.

Or

(b) Solve: $(D^2 - 4D + 3)y = \sin 3x.\cos 2x$.

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C–0019	Sub. Code 11624

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

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. Give any two uses of Nuclear energy as a power for the submarines.

2. What is LCR Circuit?

3. Explain impedance.

4. Define ground waves and sky waves.

5. What is Bistable Multivibrator?

6. Draw the logical diagram for full adder.

7. Define Modulation and its types.

8. Give the applications of Switching transistors.

9. What is meant by Ship borne VHF?

10. Describe the concepts of MCW.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Describe briefly about oil splashing and its applications.

Or

(b) Explain electrostatic charging of oil is pipeline flow.

12. (a) Write down the effect of ionosphere on radio waves.

Or

(b) Explain about half adder and full adder with circuit diagrams.

13. (a) Describe the modes of using transistors in common emitter configuration with its input and output characteristics.

Or

(b) Explain the working of RS flip flop.

14. (a) Give a short notes on Switching transistors.

Or

(b) Give a short note on frequency modulation.

15. (a) Explain the characteristics of NPN transistor in CE mode.

Or

(b) Write a short note on Ship borne VHF.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) What is meant by nuclear energy? Give a brief account on nuclear reactor.

Or

(b) Describe the theory of resonance in LCR circuit in series.

17. (a) (i) Write short notes on skip distance and skip zone.

(ii) Write short notes on Binary addition and Binary subtraction.

Or

(b) Explain construction and working of Bistable Multivibrator with neat diagram.

18. (a) Define modulation. Write a short notes on various modulation techniques and its applications.

Or

(b) Describe briefly about the principle and working of super heterodyne receiver.

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C–0021	Sub. Code 11626

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Second Semester

Nautical Science

NAVIGATION – 1

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define a Great circle with diagram.

2. Write short notes on Equator.

3. What is Prime Meridian?

4. Define Geocentric Latitude with diagram?

5. Explain D'Lat and D'Long?

6. What is Compass error?

7. Find the true course of a vessel if Fompass course is 040°(c) where deviation 15°(E) and Variation 10°(W)?

8. State difference between Nautical Mile and Geographical Mile.

9. Compare Mercator chart and Gnomonic charts.

10. Enumerate adjustable errors of a Sextant.

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

Answer **all** questions.

11. (a) Draw a neat sketch for boxing of Magnetic Compass and name each points.

Or

(b) Discuss mercator projection and its merits, demerits.

12. (a) Ship steamed from A 40°24'N 086°38'E to B 40°24'N 096°41'E. Find course and distance steamed.

Or

(b) If GMT = 19° 07 ^{H} 10^{M} 31^{S} and Ship's position 24° *oo*′ N, 154° 18′ W. Find LMT.

13. (a) How will you transfer a great circle from a Gnomonic chart to Mercator chart?

Or

(b) What is an Isogonal line? What are the causes for change in annual value of Magnetic Variation?

14. (a) Find D'Lat from following :-

	1	2	3	4
From –	21°18'N	36°44'S	43°27'N	32°09'S
To –	45°10'N	10°27'S	12°30'S	30°01'N

Or

(b) Explain meridional parts and DMP?

15. (a) Find Rhumb line course and distance from 28°20.0'S, 048°38.0'W to 14°50.0'N, 017°21.0'W.

Or

(b) Find Meridional parts and DMP using Nories tables.

(i) LAT A 02°12.0'S, LAT B 10°19.0'N

(ii) LAT P 00°04.0'S, LAT Q 12°01.2'N

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

Answer **all** questions.

16. (a) Find the course and distance from

A 04°16'N, 177°37'W to

B 02°29'N, 179°24'E.

Or

(b) Find the Ships position arrived from given details.

Initial position : 65°01.7'S, 170°54.9'W

Course : 332° Distance : 319 miles.

17. (a) Explain Principle of operation of a Sextant with diagram neatly.

Or

(b) What is Gnomonic projection and polar Gnomonic projection?

18. (a) At noon on 20th Nov your ship was in position 02° 10's 072° 54'E. Course 020° (c) Deviation 02° E, variation 10.0° E, log was set to zero. Ship steered and maintained this course till noon next day when log was showing 348. Clocks were advanced 20 min at each of three watches at 2200 hrs, 0200 hrs, 0500 hrs during the night. The vessel was stopped for one hour on 21st Nov. Leeway was 2° due to Northerly wind and estimated current $1\frac{1}{2}$ Knols setting at 250° throughout. Find DR position and EP position on 21st Nov noon?

Or

(b) Find ships position arrived after sarling a course of 241° (T) for 1897 nm from a known position A 36° 48.0' N 085° 53.0' W? What is a KNOT.

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C–0022	Sub. Code
	11632

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. Container ship is a cellular type ship. State true or false.
2. What are crates?
3. Define cargo density.
4. What do you understand by the term Dead weight?
5. Define maximum permissible loads.
6. What is battening of cargoes?
7. Define Dead weight.
8. Define union purchase.
9. What are hygroscopic cargoes?
10. How can you express the carrying capacity of a container?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What are product carriers? Explain with an example.

Or

(b) Enlist different types of General cargoes.

12. (a) What is Broken stowage? Explain in detail.

Or

(b) Distinguish between proof load and breaking strength.

13. (a) Draw the neat diagram of ventilation arrangement for General cargo space.

Or

(b) Differentiate between Ship sweat and Cargo sweat.

14. (a) State the arrangements of providing ventilation for emission of gases.

Or

(b) Draw the neat sketch of a container and label its parts.

15. (a) How will you prepare the hold space for loading refrigerated cargoes?

Or

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

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Draw the neat cross sectional diagram of a contains ship and label its parts.

Or

(b) Enumerate the duty officer's responsibilities while loading cargoes.

17. (a) Discuss the contents of Lashing Code Securing Manual.

Or

(b) List down the various types of deck cargoes and their securing arrangements.

18. (a) With an aid of neat sketch explain the stowage and securing gears of container.

Or

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

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C–0023	Sub. Code
	11633

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. What is mean by Mechanical properties of materials. Explain any two properties.

2. Define Smelting and Refining.

3. What is the use of air compressor on board?

4. Mention the objective of feed water treatment.

5. What is hydrophor system? What are the advantages of hydrophor system.

6. How temperature difference takes place accross the thermostatic expansion valve?

7. State the difference between two stroke and four stroke engines.

8. List the main component of a large two stroke marine propulsion engine.

9. Define Prime Mover.

10. Explain the principle of DC generator.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What is ferrous metals? Explain in detail about extraction of iron.

Or

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

12. (a) With the neat sketch, explain the working of hydrophor system.

Or

(b) What are the safety cut out provided in Marine Boilers?

13. (a) Explain the principle of refrigeration.

Or

(b) Write short notes on :

(i) NPSH

(ii) Positive displacement pump

(iii) Priming.

14. (a) List the components of two stroke engine.

Or

(b) Explain P.V diagram of otto cycle with neat sketch.

15. (a) Derive the efficiency equation of transformer.

Or

(b) Explain the load sharing and parallel operations of alternator.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain with the neat sketch about valve timing of four stroke and two stroke engine.

Or

(b) Sketch and describe the centrifugal pump used on board and mark the parts. What is the purpose of wear ring and Lantern ring? Explain the uses of centrifugal pump.

17. (a) What is heat treatment? Explain in detail about purposes and types of heat treatment of steel.

Or

(b) Explain the construction and working of a transformer.

18. (a) Explain the waste heat recovery system used on board (Economiser system). What are the methods of controlling the exhaust gas from the main engine and also the method of controlling the excess steam from the boiler.

Or

(b) Explain the following in a Central Air-Condition system.

(i) The single duct system

(ii) Twin duct system

(iii) The single duct with reheat.

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C–0024	Sub. Code
	11634

B.Sc. DEGREE EXAMINATION, NOVEMBER 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 Nautical mile.

2. How will you measure the distances on charts?

3. Express the meaning of chart datum.

4. State the use of Horizontal sector of light.

5. How will you measure the depth of sea?

6. What do understand by the term Drift?

7. How can you determine the intensity of wind at sea.

8. Define Leeway.

9. What is Cocked hat?

10. Why would you keep a lookout at sea?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Why do the Latitudes and Longitudes are expressed in degrees?

Or

(b) How will you decipher the symbols? Explain with an example.

12. (a) Why do we update the chart? State the reasons.

Or

(b) State the different horizontal sector lights and their uses.

13. (a) What compass deviation? State the process of correcting it.

Or

(b) Distinguish between magnetic compass and gyro compass.

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

Or

(b) Differentiate between ground track and water track.

15. (a) State the process of ship's plotting position at sea.

Or

(b) What is annual rate of change? Explain briefly.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Why do we use different types of charts for navigation. State their specific uses.

Or

(b) Draw the different shapes of lights used for navigation.

17. (a) Draw the neat sketch of Compass and mark the cardinal points on it.

Or

(b) How will you calculate the variations from the data given on the compass? Explain with neat sketch.

18. (a) Enlist 6 RAM vessels.

Or

(b) What factors are to be taken into account when determining sale speed of a ship?

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C–0025	Sub. Code
	11635

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Third Semester

Nautical Science

NAVAL ARCHITECTURE — II

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Describe Shell expansion plan.

2. Distinguish between Side door and Bow door.

3. What are the purposes of Double Bottom Tanks?

4. What are the purposes of four Peak Tanks?

5. What is Centre floatation and factors affecting their positions?

6. State Simpson's First rule.

7. Describe Spurling pipes and their securing arrangements.

8. Explain Trimming Moment.

9. What is Stern tube?

10. Define Hawse pipe.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Explain the double bottom tanks with an aid of neat sketch.

Or

(b) Describe the arrangements of double bottom in passenger ship.

12. (a) Describe what do you understand about shell plating with an aid of neat diagram.

Or

(b) State the purpose and construction of the Bilge keel.

13. (a) What are the causes of corrosion in steel and also between dissimilar metals.

Or

(b) With simple sketch explain the stern frame arrangements.

14. (a) What are the effects on the position of the centre of gravity of a ship by adding removing or shifting of weights?

Or

(b) What are the Hydrostatic and Stress data supplied to ships?

15. (a) Explain the use of Simpson's rule in the computation of volumes and centroids for area.

Or

(b) Define Longitudinal centre of buoyancy and the factors affecting their positions.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Draw the mid-ship section of general cargo ship and mention its parts.

Or

(b) A ship of 120 m long at the waterline has equidistantly spaced half ordinates commencing from forward as follows:

0, 2.9, 3.7, 5.6, 6.7, 4.6 and 0.2 m respectively. Find the area of the water-plane and TPC at this draught.

17. (a) "MV HINDSHIP" in a river port in water of Relative density 1.013 has a displacement of 12800 t GM is 0.95 m. FSC is 0.088 m she loads 430 t of cargo kg 9.5 m; 168 t of water ballast is run into No. 1 DB tank. Find the final KG.

Or

(b) Sketch and explain the construction of Aft peaks.

18. (a) What are effects on COG, COB and COF while the change in trimming moment.

Or

(b) Discuss briefly the piping and pumping out arrangements provided in Tanker ship with neat sketches.

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C–0026	Sub. Code
	11636

B.Sc. DEGREE EXAMINATION, NOVEMBER 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. What is the of double bottom tanks?

2. Where will you find the deep tanks on board ship?

3. State the purpose of following PPM on board ship.

4. Why do we carry out hose test before loading?

5. Express the duty of Command team.

6. What is the use of SARTs?

7. What are the use draft markings?

8. What is Dry-docking of a ship?

9. How will you prevent the surface of ship from corrosion?

10. Enlist the points to be discussed during safety committee meetings.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Give a brief note MS act 1958 section 95.

Or

(b) State the importance of personal health and hygiene on board ship.

12. (a) How will you ensure that the hatch are weather tight prior to loading of cargo?

Or

(b) Distinguish between hogging and sagging condition of ship.

13. (a) Which type of paints are more suitable for Boot topping area of ship? Justify your answer.

Or

(b) Describe the process of post control fumigation of living space.

14. (a) Describe the actions to be taken for the safety of passengers while the ship is in stranded condition.

Or

(b) What is Emergency signal? List the actions to be initiated by the crew after hearing this signal.

15. (a) Enumerate the different types of fire.

Or

(b) Can you use the life saving boats for rescue of others? If not, how will you rescue the stranded persons from other ship.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Discuss the Inspections and maintenance carried out on ship's hull and equipment during dry-docking.

Or

(b) Explain the Navigational lights to be exhibited by a ship of more than 50 m length power driven vessel at night.

17. (a) Express the safety situations under GMDSS in distress and safety situations in accordance with ITU and other publications.

Or

(b) What safety measured are to be observed prior to dry-docking of ship.

18. (a) DGS Order No. 6 of 2006 is dealing with what? Explain in detail.

Or

(b) Discuss the safe bunkering practices at sea.

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C–0027	Sub. Code 11637

B.Sc. DEGREE EXAMINATION, NOVEMBER 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 Geoidal Horizon.
2. Explain SHA.
3. Explain Zodiac Belt.
4. What is error of perpendicularity with respect to sextant?
5. What is "V correction"?
6. What is the use of marine chronometer?
7. What is a sidereal day?
8. What is an hour angle?
9. Explain zenith Distance.
10. What is amplitude?

Part B (5 × 5 = 25)

Answer **all** questions

11. (a) Derive the formula sin amp = sine Declaration × sec Latitude.

Or

(b) Convert below longitudes into time :

	1	2	3
longitudes :	089°56'	156°17'	178°23'

12. (a) What are zone time and standard time?

Or

(b) What are three types of horizon?

13. (a) Define Geographical position of a body and explain what is the meaning of "sun at meridian passage"?

Or

(b) Find GP of the moon at GMT, March 04^{th} 10^{H} 11^{m} $13^{S.}$

14. (a) Find correct GMT date and time. On 02^{nd} March p.m at ship in DR 16°12'N 092°10'E, chronometer time $00^{H}30^{m}12^{s}$ (error $02^{m}06^{s}$ slow).

Or

(b) Explain the term Intercept with figure?

15. (a) Why stars rise and culminate 4mn earlier than the sun each day?

Or

(b) Explain working principle of sextant?

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

Answer **all** questions.

16. (a) On 02nd Sep 2008 in DR 40°28'N 064° 20'E the rising sun bore 090°(c). If variation was $s^e w$, find the deviation of compass?

Or

(b) A star Regulus crossed the observer's meridian at 2030 hrs LMT on a certain day. At What approximate LMT will it cross observers meridian 3 days later. If the strip will be at 70°00'E long three days later, what will be the GMT of meridian passage?

17. (a) On 21st Jan 2008, In DR 24°36'S 11°20'W the sextant meridian altitude of the sun's LL was 85°03.5'. If IE was 1.6' off the arc and HE was 10m. Find the latitude and direction of PL(Lop)?

Or

(b) Explain the corrections to be applied to sextant altitude to obtain True Altitude of Sun, Moon, stars?

18. (a) On 29th Nov 2008 Am at ship in DR $25°30's, 107°\ 20'W$ the sextant altitude of star RIGEL was 35°10.3'. GRS clock was showing $11^H29^M20^S$. If IE was 2.8' on the are and the HE was 12m. Find the direction of PL (Lop) and longitude where it crosses the DR Latitude.

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'. Chronometer time was $10^H44^M12^S$ (error 03^M29^S slow). If HE was 16 m and IE was 2,8' on the arc. Calculate the intercept and the direction of PL (Lop)?

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C–0028	Sub. Code
	11643

B.Sc. DEGREE EXAMINATION, NOVEMBER 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 fuel and at least mention five properties?
2. What is sulphur content percentage of heavy fuel oil used on ships as per Global fuel sulphur cap 2020?
3. What type of scavenging system used in modern Propulsion engines?
4. What is Shaft horse power?
5. What is waste heat recovery?
6. What is the purpose of mooring winds onboard ship?
7. List out four devices used for the measurement of the liquid cargo level.
8. How long can a bow Thruster suppose to run?
9. What are the regulations for fire hose on ships as per SOLAS?
10. What is fixed fire fighting system onboard ship?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What is the duty of a Deck officer whilst ship is being ballasted?

Or

(b) Draw a simple cargo holds bilge pumping system?

12. (a) What is SOPEP? What are the line diagrams included in it? List out its locker content.

Or

(b) Draw a simple ship deck fire main line and state fire pumps requirements.

13. (a) What is economical speed of the main engine? How is economical speed determined?

Or

(b) Draw different types of cards taken from ships main propulsion engine.

14. (a) What is OWS and under what MARPOL Annex the equipment is required to install on ships.

Or

(b) How shafting alignment is performed wrt main propulsion engines crankshaft?

15. (a) What is loadicator and mention few of its use?

Or

(b) How does a cargo line value being controlled remotely?

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Which is the most preferred sewage treatment plant in ships either biological or chemical and why? Explain working principle of such preferred sewage treatment plant with a neat diagram.

Or

(b) Draw bilge and ballast system and indicate where Emergency bilge suction incorporated.

17. (a) Sketch and explain working principle of Foam Extinguisher system.

Or

(b) Explain Saties required to adhered whilst ships anchoring.

18. (a) List out advantages and disadvantages of fixed pitch and control pitch propellers.

Or

(b) Explain waste heat recovery system with a simple heat balance diagram.

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C–0029	Sub. Code
	11646

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

Fourth Semester

Nautical Science

NAVIGATION — III

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Explain composite great circle sailing?

2. Define vertex of great circle.

3. What is Bary centre?

4. What is occultation of planets?

5. What is differential GPS?

6. State the uses of RADAR.

7. What is a Circumpolar body?

8. What is Sidereal period of Moon?

9. What do you understand by term Transducer?

10. Tilting of Gyro compass is caused by ————————?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Why knowledge of position of the vertex is useful to the Navigator?

Or

(b) How will you find the intermediate positions along the GC track?

12. (a) Explain conditions required for a Lunar Eclipse.

Or

(b) Explain conditions required for a Solar Eclipse.

13. (a) State five errors of RADAR.

Or

(b) How does PRF and Pulse Length affect a RADAR?

14. (a) Explain Anomalous propagation.

Or

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

15. (a) Explain benefits of SVDR at sea.

Or

(b) Compare GPS and GLONASS system.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Find initial course, distance and vertex on a GC track from A = 24º 00'N 074º 15'W to B = 46º00'N 053º 45' W.

Or

(b) With the help of neat sketch explain working principle of Echo Sounder.

17. (a) Explain with diagram phases of Moon.

Or

(b) What are the uses and limitations of AIS in navigation of a ship?

18. (a) Explain drifting and tilting of Gyro compass. What are the main causes of errors in a Gyro compass on a ship?

Or

(b) Explain with a neat sketch the controls of ARPA in a radar equipment.

———————

C–0030

Sub. Code
11651

B.Sc. DEGREE EXAMINATION, NOVEMBER 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** questions.

Draw diagrams wherever applicable.

1. What is the advantage of timber deck cargo?
2. Name various lashing arrangements for timber deck cargo?
3. What do you understand by "Mate's Receipt'? Who signs the Mate's receipt?
4. What are the functions of "Bill of lading"?
5. What is the objective of "IMDG code"?
6. What is meant by "MFAG" and what is its use?
7. What is the meaning of 'Jettisoning cargo"?
8. What is labelling and its importance?
9. What is TLV?
10. What is meant by "CERTIFICATE OF FITNESS'?

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) What are the contents of "code of safe working practices for ships carrying timber deck cargoes"?

Or

(b) Briefly explain the hazards involved in carrying timber deck cargoes.

12. (a) What is "note of protest"? What are the supporting documents required?

Or

(b) Write short notes on "cargo claims'.

13. (a) "Timber deck cargo requires regular inspection" - support the statement.

Or

(b) Briefly explain the effects of heavy lifts on the seaworthiness and the stability of the ship.

14. (a) Explain the contents of cargo securing manual.

Or

(b) What are the precautions you observe when loading IMDG cargo?

15. (a) What are the entries made in the cargo log book of a chemical tanker?

Or

(b) Briefly explain fully pressurised and semi pressurised gas tankers.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) What is meant by "Charter Party"? Explain different charter parties.

Or

(b) Explain the loading of "Timber deck cargo" and 'stowage and securing arrangements".

17. (a) (i) Write down different classifications of IMDG cargo.

(ii) Write short notes on "Explosives".

Or

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

18. (a) Explain the discharging procedure of a chemical tanker.

Or

(b) Explain Types A, B and C of a gas carriers.

———————

C–0031

Sub. Code
11652

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Fifth Semester

Nautical Science

VOYAGE PLANNING AND COLLISION PREVENTION — III

(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 "MAST HEAD LIGHT".
2. What is the day signal for
   (a) CBD V/L
   (b) NUC V/L
3. What is the meaning of "Fleet 77"?
4. Name the FOUR alphabetical subjects NAVTEX cannot be rejected.
5. What are the types of messages available with "ECG"?
6. What is meant by "RADAR" and its uses?
7. Define the meaning of "FLEET NET".

8. Define the meaning of "MMSI".

9. Define "Luminous range".

10. What do you understand by "Doubling the angle on the bow"?

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

Answer **all** questions.

11. (a) (i) What is meant by IALA system of buoyage?

(ii) Briefly explain its types. Which type of IALA region INDIA belongs to.

Or

(b) Abbreviate and briefly explain

(i) NBDP

(ii) SARI

(iii) EPIRB

(iv) AMVER.

12. (a) What do you understand by "VTIS"?. Explain how VITS helps in navigation of ships in congested waters?

Or

(b) What are the routine checks you will carry out for GMDSS equipments?. What are the log book entries you make about the checks?

13. (a) Define "SAFE SPEED"? Explain.

Or

(b) Explain how do you overtake in a "NARROW CHANNEL"?

14. (a) Will you use "Floating navigational aids" for position fixing. Support your answer with an explanation.

Or

(b) Draw a "TRAFFIC LANE" and a "SEPARATION ZONE" and explain.

15. (a) How do you obtain a fix using "HORIZONTAL SEXTANT ANGLE"?

Or

(b) How do you obtain a fix using "Running fix method".

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

Answer **all** questions.

16. (a) Explain "Passage planning" in details.

Or

(b) What is the meaning of "Distress message"? How do you sent a message through Radio Telephony?

17. (a) Write in detail about "Sound signals in restricted visibillty"(Rule no.35).

Or

(b) Explain the working of COSPOS-SARSAT system in SAR.

18. (a) Name the different areas of GMDSS?. Explain each area in detail.

Or

(b) Define "WWNWS". What are the warnings receiving from different sea areas?

———————

C–0032

Sub. Code
11653

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Fifth Semester

Nautical Science

COMPUTER PROGRAMMING AND UTILITIES

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. What is a microprocessor?
2. What is a programming language?
3. What is the difference between compiler and interpreter?
4. Define data Dictionary.
5. What are the functions of Arithmetic and Logic Unit (ALU)?
6. Distinguish between constructor and method abstract class and interface.
7. Define Data base and Types.
8. Difference between internet and Intranet.
9. Define Cryptography.
10. Difference Between Functions and variable.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Explain classifications of Computer.

Or

(b) Explain about types of Computer language.

12. (a) Explain in details about component of date base? With neat diagram.

Or

(b) Briefly explain Characteristic database.

13. (a) Define Function. Explain types of Function with proper example program.

Or

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

14. (a) Explain in detail about various Types of Network. With neat Diagram.

Or

(b) Define cryptography. Characteristic of Cryptography.

15. (a) Explain Program Development Life Cycle.

Or

(b) Discuss about the Standard functions in MS-Excel.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Discuss about various types of output devices and Output devices with Neat diagram.

Or

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

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

Or

(b) Briefly explain in details about Type of network Topologies? with neat Diagram.

18. (a) Explain in details about OSI Layer and types with neat diagram.

Or

(b) What are the different types of chart in spreadsheet? With suitable example?

———————

C–0033	Sub. Code
	11654

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Fifth Semester

Nautical Science

SHIPPING MANAGEMENT

(2016 onwards)

Duration: 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

1. Define Planning.
2. Define MIS.
3. What is known as organization?
4. Define Port.
5. Define Cargo.
6. Define Fleet.
7. Define Freight.
8. What do you mean by C&F?
9. Define Master Bill of lading.
10. Define Time charter.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Describe about Man power planning in detail.

Or

(b) Explain about different types of shipping services.

12. (a) Explain the process of written and oral executive communications.

Or

(b) Describe in depth about Cargo Management and its process.

13. (a) Explain about Ports, functions and its range of services.

Or

(b) Describe about India's major ports and its functional activities.

14. (a) Explain Basic structure of shipping industry.

Or

(b) Describe about cleaning and forwarding agent role in Shipping Management.

15. (a) Explain about Tramp trade and its process.

Or

(b) Describe the process and calculation of lag time in detail.

Part C (3 × 10 = 30)

Answer **all** questions.

16. (a) Explain about the different types of Bills of Ladings.

Or

(b) Explain about Basic customs house procedure.

17. (a) Describe about organization behavior in detail.

Or

(b) Explain the liner and Tramp service in Merchant Navy vessels.

18. (a) Explain about load line and its basic calculations. Also draw the load line markings and its zone problems.

Or

(b) Explain about the importance of Decision making concepts.

———————

C–0034	Sub. Code
	11655

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Fifth Semester

Nautical Science

METEOROLOGY AND OCEANOGRAPHY – I

(2016 onwards)

Duration: 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. Define Air pollution.
2. State Environmental lapse rate.
3. Define Insolation.
4. What is a Isallobar?
5. Define Pressure Gradient.
6. What is Geostrophic wind?
7. State Buy's Ballot's law.
8. What is Hail and haze?
9. Define Relative humidity.
10. Define Swell.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Differentiate Gradient and Cyclostrophic winds.

Or

(b) Describe the impact of weather on Maritime industry.

12. (a) Describe the general circulation of ocean currents.

Or

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

13. (a) Describe the behaviour of waves in Shallow water.

Or

(b) Describe about tide producing forces.

14. (a) What do you meant by diurnal variation of pressure?

Or

(b) Describe about diurnal and seasonal variation of water vapour.

15. (a) Explain the factors affecting atmospheric motion.

Or

(b) Give an account on Beanfort scale of wind force.

Part C

$(3 \times 10 = 30)$

Answer **all** questions.

16. (a) Describe the horizontal distribution of atmospheric pressure and the resulting circulation with a diagram.

Or

(b) Give an account on Greenhouse effect and Global warming.

17. (a) Define fog. Describe the formation and types of fog explain the effects of fog on maritime industry.

Or

(b) How clouds are formed and describe the types of clouds?

18. (a) Describe about true wind and apparent wind.

Solve this : On a vessel steaming 270° at 10 knots, the apparent wind was observed to be 150° at 12 knots. Find the direction and speed of the true wind.

Or

(b) Define tide, explain the types of tides and how it is predicted.

C–0035	Sub. Code
	11656

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Fifth Semester

Nautical Science

NAVIGATION — IV

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 2 = 20)

Answer **all** questions.

Note : (1) Draw diagram wherever it is applicable.

(2) Use of Tide tables or other tables allowed.

(3) Use of 2008 Nautical Almanac is allowed.

1. What do you understand by "STAR CONSTELLATION"?

2. Name any four stars and state the magnitude of the stars? (Use Almanac).

3. You are at sea watch. You hear "STEERING MOTOR ALARM". What will be your action?

4. What do you understand by "NAVIGATION LIGHT ALARM"?

5. What is the use of "AUTO PILOT"?

6. What do you understand by "OFF COURSE ALARM"?

7. What do you understand by "SEMI DIURNAL TIDE"?

8. Define "CHART DATUM".

9. What is the purpose of "VDR"?

10. What is the use of "AIS"?

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

Answer **all** questions.

11. (a) Write down any five alarms on bridge. What action will you take upon hearing the alarm?

Or

(b) What are the alarms associated with Steering gear? Explain. What action will you take upon hearing the alarm?

12. (a) What are the modes of steering? How will you change over from manual to Auto? Also explain how you will use Non follow up steering.

Or

(b) Briefly explain the principle and working of an Auto pilot.

13. (a) Draw a neat sketch of different levels of tide and mark them.

Or

(b) What is tidal stream? What is the equilibrium theory of tides?

14. (a) Explain the principle of Doppler shift.

Or

(b) Briefly explain the care and maintenance of Gyro compass.

15. (a) Enumerate the benefits of S — VDR.

Or

(b) Enumerate the errors of an Echo sounder.

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

Answer **all** questions.

16. (a) Explain the principle and operation of any one type of Doppler log.

Or

(b) Explain the Principle and working of AIS.

17. (a) What is VDR? State the information available in VDR.

Or

(b) Explain Lunar tide in detail.

18. (a) Find the height of tide at 1930 hrs. Standard time on 4th FEB at DARWIN. Extract from the tide tables for the day under reference are as under:

EXTRACT FROM ATT

Time	Height
0315	1.7 M
0904	6.5 M
1502	1.9 M
2112	6.9 M

Or

(b) Find the time at which there will be 7.0 mtrs of water in the afternoon of 27th April on a shoal patch, off Darwin where the chart shown 3 mtrs sounding.

Extracts from the Adm. Tide Tables for the day are as follows :

Time	Height
0550	6.6 M
1157	2.5 M
1743	6.30 M

C–0036	Sub. Code
	11661

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

Sixth Semester

Nautical Science

MARINE ENVIRONMENTAL PROTECTION

(2016 onwards)

Duration : 3 Hours Maximum : 75 Marks

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

Answer **all** questions.

1. What do you understand by the term Double hull? To which ships these are provided?

2. Define NPDE system.

3. Why do the ships are constructed with sludge tanks?

4. Describe IOPP certificate.

5. What is the purpose of ODMC system?

6. State the validity period of Pollution certificate.

7. What is PPM?

8. What are Noxious liquid substances?

9. State the process of plastics disposal on board ship.

10. Describe Ozone depletion.

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) State the special areas in which the discharge of oily water is prohibited.

Or

(b) Explain the MARPOL 73/78.

12. (a) List down the discharge criteria for ships other than oil tankers.

Or

(b) Describe the process by which the Noxious liquid substances are affecting ozone layer.

13. (a) State the preventive measures to be taken prior to PSC inspection under Regulation 16 of MARPOL Annex-II.

Or

(b) What is SOPEP? Explain in detail.

14. (a) What do you understand by the term Marking and Labeling with respect to package of Harmful substances?

Or

(b) How will you discharge the garbage waste from ships? State the operational requirements as per PSC for this operation.

15. (a) State the requirements for the ships which are operating within Emission control area.

Or

(b) What is IMO 2020? Explain in the ships fuel requirement as per this standard.

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

Answer **all** questions.

16. (a) List the various MARPOL certificates to be carried by the tanker ships and their validity also.

Or

(b) What is PSC? State the circumstances under which the ships can be detained by PSC officers. Explain in detail.

17. (a) What is MARPOL Annex-III? Explain the statutory requirement of this annexure for the ships.

Or

(b) What is bunkering? State sequences of actions to be initiated if there is an accidental discharge of oil.

18. (a) Discuss the Ballast Water Management System for ships.

Or

(b) With the aid of neat sketches explain the Crude oil washing system.

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C–1210	Sub. Code 11613

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

First Semester

Nautical Science

BASIC SHIP KNOWLEDGE

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. Total number of major ports in Tamil Nadu are

   (a) 10 (b) 12

   (c) 13 (d) 14

2. Ro-Ro ships are used for carrying

   (a) Automobile Vehicles

   (b) Vegetables

   (c) Ores

   (d) Livestock

3. Bilge keel is provided for the purpose of

   (a) Stability (b) Friction reduction

   (c) Reduce corrosion (d) None of the above

4. The upward curvature of the weather deck is known as

   (a) Camber (b) Keel

   (c) Bilge keel (d) Flare

5. Bow Thruster is provided at

(a) Forepeak (b) Aft peak

(c) Midship (d) Near propeller shaft

6. Draught markings indicates the

(a) Submerged vertical height of ship's Hull

(b) Height of ship's Hull above water level

(c) Height of superstructure above water level

(d) None of the above

7. Double Bottom tanks are used for

(a) Stowage of water

(b) Stowage of Cargo

(c) Stowage of Fuel oil

(d) Stowage of all liquids

8. The Engine Room onboard ship is located at

(a) Lower most deck (b) Uppermost deck

(c) Forepeak (d) Aftpeak

9. Load line markings indicate the Master to identify

(a) The amount of cargo to be loaded

(b) The amount of empty space to be maintained

(c) Draught markings

(d) None of the above

10. The Shell expansion drawing is referred to calculate the

(a) Thickness of hull plates

(b) Tonnage of ship

(c) Draught markings

(d) None of the above

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Enumerate the major ports in India.

Or

(b) Describe the need of Modern ports.

12. (a) List down any ten types of merchant vessels.

Or

(b) With an aid of neat diagram explain the difference between LOA and LBP of ships.

13. (a) Explain the Timber Load line markings.

Or

(b) Explain the purpose and location of Wheel house.

14. (a) Describe the layout of Superstructure.

Or

(b) Draw the Double bottom tank and label the parts.

15. (a) Explain the numbering system of Hull frames.

Or

(b) What are International date lines? Explain in details.

Part C (5 × 8 = 40)

Answer **all** questions.

16. (a) Discuss the development of Modern ports.

Or

(b) Explaining the following :

(i) Shear strake
(ii) Rise of floor
(iii) Air Draught
(iv) Base line
(v) Parallel middle body

17. (a) Draw the neat diagram of General cargo ship Engine room layout.

Or

(b) With an aid of neat sketch explain the Timber Load line markings and label the Different water levels.

18. (a) Draw the profile view of General cargo ship and mark the parts.

Or

(b) Explain the ventilation system of Tanker ship.

19. (a) How will you anchor the ship in a rocky area? Draw a neat diagram and explain in detail.

Or

(b) Draw the General arrangement diagram of cargo ship and mark important compartments.

20. (a) List down the precautions to be made on approach of Bad weather.

Or

(b) Enumerate any eight principal dimensions of a ship.

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C–1211	Sub. Code 11614

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

First Semester

Nautical Science

BASIC KNOWLEDGE OF NAVIGATION – I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. What is the angle of inclination of earth?

   (a) Zero (b) 45°

   (c) 23.5° (d) 180°

2. Choose the correct value of polar radius of earth.

   (a) 6357 Km (b) 7500 Km

   (c) 1025 Km (d) 5600 Km

3. Mention the value of Statute mile.

   (a) 5280 ft (b) 5589 ft

   (c) 6505 ft (d) 7895 ft

4. Specify the angle of International Date Line

(a) 60° (b) 150°

(c) 160° (d) 180°

5. The occasion for hoisting Courtesy flagon board ship while is at :

(a) Sea (b) Foreign port

(c) Indian Port (d) None of the above

6. How will you express the speed of ship?

(a) Knot (b) Mile

(c) Kilometre (d) Fathom

7. Expand GMT

(a) Greenwich Mean Time

(b) Greater Mile time

(c) Greater Mean Time

(d) Great Britain Mile Time

8. How many compasses are provided in ships?

(a) One (b) Two

(c) Three (d) Four

9. What is the maximum angle of inclination of Rudder on either side?

(a) 27° (b) 35°

(c) 60° (d) 45°

10. Which compass is working on the principle of Gyroscope?

(a) Gyrocompass (b) Magnetic compass

(c) None (d) Vastu compass

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

Answer **all** questions.

11. (a) Define difference between latitude and longitude.

Or

(b) Describe Prime meridian with diagram.

12. (a) Find the deviation and fill in the table :

	1	2	3
Brg (C)	196°(C)	151°(C)	274°(C)
0Brg (M)	181°(C)	146°(C)	282°(C)
Dev.	–	–	–

Or

(b) How will you determine your location at sea?

13. (a) Find Relative bearing from the following :

	1	2
T.Brg :	285°	35°
T.Course :	210°	102°
R.Brg :	–	–

Or

(b) Define Rhumb line with neat diagram.

14. (a) Compare 'D long with DMP'.

Or

(b) State the uses of Gnomonic chart for ship's navigation.

15. (a) Discuss method of measuring compass error using transit bearing.

Or

(b) Find the position arrived after sailing 251°(T) for 856 mile from a starting position P 00°14'S 147°10'W.

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

Answer **all** questions.

16. (a) Find the course and distance of using parallel sailing :

From	A	35° 00'N	154°	10'E
To	B	39° 15'N	138°	10'E

Or

(b) (i) Describe as an ellipsoid.

(ii) Discuss the direction on earth's surface.

17. (a) Explain the Boxing of compass with neat diagram.

Or

(b) Find the course and distance of using Traverse Table :

From	A	53° 30'N	165° 12'W
To	B	42°13'N	170°23'E

18. (a) Day's work: On 6th May a ship in position 50° 24'S 148° 12'E steamed as follows :

	True	Co (c)	Dev.	L'way	Wind	Speed kn
3rd	0800	140°	5°E	4 5°	SWXW	8
	1200	130°	4°E	6.5°	SWXW	7
	1600	125°	3°E	NIL	SW	6
	2000	1200	3°E	NIL	SW	7.0
	2400	115°	3°E	NIL	S	6
	0400	100°	2°	NIL	S	7
4th	0800	95°	NIL	NIL	S	7

Variation 10°E throughout. Find the DR position at morning 0800 Hours on 5th June and if the observed position, then was 44° 10'S 174° 20'E. Find the set and drift of current.

Or

(b) Prove the Diff of Longitude = Cosine of Latitude with an example.

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

Or

(b) Discuss briefly about Maritime geography.

20. (a) Explain the Major Ocean routes of Maritime sector and the precautions to be observed with respect to Navigation in detail.

Or

(b) Explain the relationship between departure and difference of longitude in cases involving a change of latitude by using mean latitude.

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C–1212	Sub. Code 11615

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023

First Semester

Nautical Science

NAUTICAL MATHEMATICS — I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. When a plane cuts a sphere the section thus formed is called ————

(a) a circle (b) a small circle

(c) a diameter (d) none

2. The intersection of the planes of two great circle is a ————

(a) great circle (b) circle

(c) diameter (d) lines

3. The ———— of the diameter perpendicular to a section of the sphere are called the poles of the section.

(a) diameter (b) extremities

(c) the axis (d) none

4. Value of $\frac{co\sec^2\theta - 1}{co\sec^2\theta}$ is

(a) $\cos^2\theta$ (b) $co\sec^2\theta$

(c) 1 (d) None of these

5. Find the grad(f) if $f(x, y, z) = xy + y^2z$ at the point $(0, 1, -1)$?

(a) $2i + j + k$ (b) $\vec{i} - 2\vec{j} + \vec{k}$

(c) $\vec{i} + 2\vec{j} + \vec{k}$ (d) $\vec{i} - \vec{j} - \vec{k}$

6. In a vector field, divergence of the gradient is

(a) curl (b) unity

(c) zero (d) laplacian

7. $\overline{|(n+1)} = n!$ can be used when ————

(a) n is any integer

(b) n is a positive integer

(c) n is a negative integer

(d) n is any real number

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

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

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

9. ———— is equal to the maximum number of linearly independent row vectors in a matrix

(a) Row matrix (b) Rank of a matrix

(c) Term matrix (d) Linear matrix

10. The lowest eigen value of the 2×2 matrix $\begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$ is _____

(a) 5 (b) 3

(c) 1 (d) 2

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

Answer **all** questions.

11. (a) Show that in any spherical triangle ABC

$$\frac{\sin (A + B)}{\sin c} = \frac{\cos a + \cos b}{1 + \cos c}$$

Or

(b) In a spherical triangle ABC. Given $AB = 50^\circ 10'$, $AC = 64^\circ 17'$, $BC = 27^\circ 37'$. Find C using Haversine formula.

12. (a) Explain Napier's rule.

Or

(b) In an equilateral spherical triangle ABC, prove that $1 - 2 \cos A = \tan^2 \frac{a}{2}$.

13. (a) Find y_n if $y = \log \frac{2x + 3}{3x + 2}$.

Or

(b) Verify that $fyx = fxy$ when $f = x^3$.

14. (a) Prove that $\int_0^\infty e^{-x^2}\,dx = \frac{\sqrt{\pi}}{2}$ using Gamma function.

Or

(b) Evaluate $I = \int_0^1 \int_0^2 xy^2 dy\,dx$.

15. (a) Find the sum and product of the eigen values of the matrix $\begin{pmatrix} 3 & -4 & 4 \\ 1 & -2 & 4 \\ 1 & -1 & 3 \end{pmatrix}$ with out actually finding the eigen values.

Or

(b) Find the rank of the matrix $A = \begin{pmatrix} 1 & 1 & 1 & 1 \\ 4 & 1 & 0 & 2 \\ 0 & 3 & 4 & 2 \end{pmatrix}$ by examining the determinant minors.

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

Answer **all** questions.

16. (a) ABC is a spherical triangle in which $b = c$. Prove that $\cos B = \cot b \tan \frac{a}{2}$, hence find B if $a = 60^\circ 25'$, $b = 55^\circ 18'$.

Or

(b) In a spherical triangle ABC, show that $\sin 2c = \cos a \sec^2 \frac{A}{2}$ when $b + c = \frac{\pi}{2}$.

17. (a) Derive the Haversine formula.

Or

(b) In a quadrantal triangle ABC, $b = 78^\circ 14'$, $c = 49^\circ 08'$ and $a = 90^\circ$. Determine the angle A and B.

18. (a) If $y = \sin[\log(x^2 + 2x + 1)]$ prove that $(1 + x)^2 y_{n+2} + (2n + 1)(1 + x) y_{n+1} + (n^2 + 4) y_n = 0$ using Leibnitz's theorem.

Or

(b) If $u = \sin^{-1}\left[\frac{x^3 + y^3 + z^3}{ax + by + cz}\right]$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 2\tan u$. Using Euler's theorem.

19. (a) Evaluate $\int_0^{\frac{\pi}{2}} \int_0^{\alpha} \frac{r}{(r^2 + a^2)^2} \, dr d\theta$.

Or

(b) Change the order of Integration in $I = \int_0^{\frac{\pi}{2}} \int_0^{2a\cos\theta} f(r, \theta) \, r dr d\theta$.

20. (a) Solve the following homogeneous equations $x + y + 3z = 0;\ x - y + z = 0; x - 2y = 0$.

Or

(b) Find the eigen value and eigen vector of the matrix

$$A = \begin{pmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{pmatrix}.$$

———————

C–1213	Sub. Code
	11616

B.Sc. DEGREE EXAMINATION, NOVEMBER 2023.

First Semester

Nautical Science

NAUTICAL PHYSICS AND ELECTRONICS — I

(2023 onwards)

Duration : 3 Hours Maximum : 75 Marks

Part A (10 × 1 = 10)

Answer **all** questions.

1. What is the angle of dip at magnetic poles of earth

   (a) Zero (b) 45°

   (c) 90° (d) 180°

2. The refrigerator works on the principle of?

   (a) Osmosis

   (b) Centrifugation

   (c) Dispersion

   (d) Evaporation

3. A ray reflected successively from two plane mirrors inclined at a certain angle undergoes a deviation of 3000. Then the number of images observable is

   (a) 60 (b) 12

   (c) 11 (d) 5

4. Which of the following statement is correct for the Doppler effect?
   (i) The apparent frequency will be more than the actual frequency when the observer moves towards the stationary source
   (ii) The apparent frequency will be more than the actual frequency when the source moves towards the stationary observer
      (a) Only (i) is correct
      (b) Only (ii) is correct
      (c) Both (i) and (ii) are correct
      (d) Neither (i) nor (ii) is correct

5. Which of the following is know, as indirect band gap semiconductor?
   (a) Germanium (b) Nickel
   (c) Platinum (d) Carbon

6. According to Hooke's Law, if stress is increased the ratio of stress to stain will
   (a) Increase (b) Decrease
   (c) Remain constant (d) First increase then decrease

7. Positive feedback is used in
   (a) Oscillators (b) Low gain amplifier
   (c) High gain amplifier (d) Rectifier

8. Which of the following is / are the universal logic gates?
   (a) OR and NOR (b) AND
   (c) NAND and NOR (d) NOT

9. Modulation is required
   (a) To transmit electrical signals over an antenna through free space
   (b) To improve the signal to noise ratio
   (c) To make the low frequency signals travel long distance
   (d) All of the above

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

(a) 4 (b) 5

(c) 7 (d) 10

Part B (5 × 5 = 25)

Answer **all** questions.

11. (a) Difference between soft and hard magnetic materials.

Or

(b) Derive the expression for thermal efficiency of a Carnot cycle with its p-V and Ts Diagram?

12. (a) Write laws of refraction. Explain the same with the help of ray diagram, when a ray of light passes through a rectangular glass slab.

Or

(b) Two trains A and B are moving towards each other at a speed of 432 km/h. If the frequency of the whistle emitted by A is 800 Hz then what is the apparent frequency of the whistle heard by the passenger sitting in train B.

13. (a) How the gyroscope concept used in ship?

Or

(b) Explain the cantilever beam.

14. (a) Briefly discuss about the semiconductor, properties and classification with examples.

Or

(b) Explain in detail about the zoner diode as voltage regulator.

15. (a) Explain in detail the negative and positive feedback amplifier with necessary diagram.

Or

(b) Explain in detail about the Wein bridge oscillator.

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

Answer **all** questions.

16. (a) Give a brief note on magnetic elements of the earth.

Or

(b) Explain the different modes of heat transfer.

17. (a) Explain the phenomena of total internal reflection.

Or

(b) Explain the working of He-Ne Laser.

18. (a) Write a short notes on streamline and turbulence flow with examples.

Or

(b) Explain in detail about the LED.

19. (a) Explain about the Ripple Factor, Peak inverse Voltage and the efficiency of full wave bridge rectifier with necessary circuit diagram.

Or

(b) What are the types of flip flop and explain different types a of flip flop?

20. (a) Derive the maximum range for a radar system from first principles.

Or

(b) Explain the architecture, data flow and instruction execution of 8085 microprocessor.

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