



भारतीय समुद्री विश्वविद्यालय  
INDIAN MARITIME UNIVERSITY  
(Central University, Govt. of India)

IMU/AS/16<sup>th</sup> AC/ATR/LE-CET/2016

Dated:23-12-2016

**CIRCULAR 1654**

Sub: Syllabus for Online Common Entrance Test for Lateral Entry of  
DNS Candidates into 2<sup>nd</sup> Year B.Sc (Nautical Science).

Ref: Agenda Item No:AC 2016-16-24 of 16<sup>th</sup> Academic Council  
Meeting held on 08-12-2016.

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The Academic Council in its 16<sup>th</sup> Meeting vide Agenda Item No: AC 2016-16-24 has approved the above Syllabus for Online Common Entrance Test (CET) for Lateral Entry of DNS candidates into 2<sup>nd</sup> year B.Sc (Nautical Science).

The approved Syllabus is displayed on IMU's website for the information of DNS students seeking Lateral Entry into B.Sc (Nautical Science) in the Second year.

A candidate seeking Lateral Entry in the 2<sup>nd</sup> year B.Sc (Nautical Science) must have passed DNS programme (both semesters) in full. The candidates are expected to prepare for the Online CET on their own.

All passed-out DNS students including those admitted in the February 2016 batch of DNS are eligible to appear in the Online CET for Lateral Entry in 2<sup>nd</sup> year B.Sc (Nautical Science) in 2017-18. Thereafter, from the academic year 2018-19 onwards, Lateral Entry will be restricted only to candidates who had passed DNS within five years from the year in which Lateral Entry into 2<sup>nd</sup> year B.Sc (Nautical Science) is sought.





**INDIAN MARITIME UNIVERSITY**

**(A Central University under Ministry of Shipping)**

**Syllabus for Online Common Entrance Test  
for Lateral Entry of D.N.S Candidates into  
2<sup>nd</sup> Year B.Sc (Nautical Science)**

**Effective from Academic Year 2017-18.**

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**Syllabus for Online Common Entrance Test**  
**for Lateral Entry of DNS Candidates into**  
**2<sup>nd</sup> Year B.Sc. (Nautical Science)**

<i>Module No.</i>	<i>Subject Name</i>	<i>Marks</i>
Module 1	English & General Knowledge	30
Module 2	Computer Science	30
Module 3	Mathematics	60
Module 4	Physics, Electricity & Electronics	80
Total		200

*Note 1:* The Syllabus is only indicative and not exhaustive. IMU reserves the right to set questions from related topics that may not have been mentioned here. IMU also reserves the right to vary the relative weightage (in terms of marks) given to the various Modules.

*Note 2:* The questions will be of objective type (multiple choice questions).

*Note 3:* The duration of the Online CET will be 3 hours.

*Note 4:* The candidates are expected to prepare for the Online CET on their own.

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<b>MODULE 1</b>	<b>ENGLISH &amp; GENERAL KNOWLEDGE – 30 Marks</b>
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Synonyms, Antonyms, Spelling Check, Grammar Check, Sentence Completion, Direct and Indirect Speech, Active and Passive Voice, Tense, One Word substitution, Reading Comprehension, Ordering of Sentences, Sentence Correction/Improvement, Idioms and Phrases, General Knowledge.

<b>MODULE 2</b>	<b>COMPUTER SCIENCE – 30 Marks</b>
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<b>1</b>	<b>Computer Arithmetic:</b>
	<p>Binary, octal, decimal &amp; hexadecimal number Systems &amp; mutual conversion: addition, Subtraction, Multiplication, Division, 1's &amp; 2's complement method of subtraction in binary only. Binary codes: BCD numbers, Excess – 3 code, ASCII code, EBCDIC code Gray code.</p> <p><b>Memory</b> Main Memory, Secondary Memory, Backup Memory, Cache Memory, Real and Virtual Memory. System Software and Programming Techniques: Machine language, Assembly language, Low level and High level Languages, Compiler, Assembler, and Interpreter.</p>
<b>2</b>	<b>E – Commerce:</b>
	<p>Introduction, IT and business, E-commerce: Concepts Electronic Communication, Internet and intranets. EDI to E-commerce. Concerns for E-commerce Growth, Technical issues, Security issues. Security Technologies: Cryptography, Public Key Algorithms, Private Key Algorithms, Hashing techniques, Cryptographic Applications, Encryption, Digital Signature Protocols for Transactions. SSL-Secure Socket Layer, SET-Secure Electronic Transaction. Cyber Cash, Dig cash.</p>
<b>3</b>	<b>Computer Programming Language:</b>
	<p>History of C Language, Structure of a C program, Statements, Basic Data Types, Variables &amp; Constants, Input &amp; Output statements, Operators and Precedence, Expressions, Simple C programs.</p> <p><b>Control Statements</b> Branching Structures : if.. else Multiple Branching Structures : switch .. case Repetitive Structures : for loop, while loop, do..while loop Jump Statements : break, continue and goto.</p> <p><b>Arrays And Pointers</b></p>

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<p>One &amp; two dimensional arrays, strings, manipulation of arrays Introduction to Pointer. Declaring pointer variable, initialization of pointer variable, accessing address of variable, pointer expressions.</p> <p><b>Functions</b> Introduction, modular approach of programming, creating user defined functions with and without parameters, Parameter passing mechanism and returning values from functions.</p> <p><b>Structures</b> Defining structure, declaring and accessing structure members, initialization of structure. Advantages of using structures.</p>
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**Recommended Books for Reference: Computer Science**

1. Information Technology for management: Henry Lucas, Tata Mc-Graw Hills
2. Computer Fundamentals Architecture and Organization: B.Ram ,New Age International Publisher
3. Microsoft Access 2007 Step by Step: Steve Lambert, Microsoft Press
4. Programming in 'C' by Balgurusamy, 3rd edition Tata Mc-Graw Hill
5. Let us 'C' by Kanitkar, 3rd edition BPB publication
6. Complete reference 'C' by Herbert Schildt, 4th edition Tata Mc-Graw Hill
7. The Complete E-Commerce Book: Design, Build, and Maintain a Successful Web-Based Business: Janice Reynolds

<b>MODULE 3</b>	<b>MATHEMATICS – 60 Marks</b>
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<b>1</b>	<b>Integral Calculus:</b>
	Multiple Integrals-Double integration-definitions, Evaluation of Double Integrals, Change of order of integration, Evaluation of double integrals by changing the order of integration and changing to polar form. Triple integration-definition and evaluation (Cartesian, cylindrical and spherical polar coordinates). Application of double integrals to compute Area, Mass, Volume. Application of triple integral to compute volume.
<b>2</b>	<b>Vector Calculus:</b>
	Differentiation of Vectors, Gradient of a scalar point function, Divergence & Curl of Vector point function.

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<b>3</b>	<b>Differential Calculus:</b>
	Successive differentiation: Standard form to find the nth derivative. Leibnitz's theorem (without proof) & problems, Rolle's theorem (without proof), Lagrange's & Cauchy's mean value Theorem (without proof). Taylor's theorem, Taylor's and Maclaurin's series (without proof). Expansion of $e^x$ , $\sin x$ , $\cos x$ , $\tan x$ , $\sinh x$ , $\cosh x$ , $\tanh x$ , $\log(1+x)$ , $\sin^{-1} x$ , $\cos^{-1} x$ . Partial derivatives of first and higher Orders. Total differentials, differentiation of composite & implicit functions. Euler's theorem on homogeneous functions with two and three independent variables (with proof). Deductions from Euler's theorem. Errors & Approximations. Maxima & Minima of the functions of two variables.
<b>4</b>	<b>Laplace Transforms:</b>
	Function of bounded variation (statement only). Laplace transforms of $1$ , $t^n$ , $e^{at}$ , $\sin(at)$ , $\cos(at)$ , $\cosh(at)$ , $\sinh(at)$ , Linearity property, shifting properties. Expressions (with proofs) for: $(i)L\{t^n f(t)\} \quad (ii)L\left\{\frac{f(t)}{t}\right\} \quad iii L\left\{\int_0^t f(u)du\right\} \quad (iv)L\left\{\frac{d^n}{dt^n} f(t)\right\}$ Laplace transform of periodic functions. Evaluation of inverse Laplace transforms using theorems & partial fraction methods, convolution theorem (without proof). Application of Laplace transforms to solve initial and boundary value problems involving linear differential equations with constant coefficients. Simultaneous linear equations with constant coefficients.

**Recommended Books for Reference:**

1. Higher Engineering Mathematics - Dr. Grewal, B.S
2. A Text book of applied mathematics Vol.I & Vol.II - Wartikar, P.N. & Wartikar, J.N

<b>MODULE 4</b>	<b>PHYSICS, ELECTRICITY &amp; ELECTRONICS – 80 Marks</b>
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**SECTION A: PHYSICS & ELECTRICITY**

<b>1</b>	<b>Properties of Matter:</b>
	Atmospheric Pressure, Barometer, Elasticity, Modulus of elasticity, Hooke's Law, Cantilever, Bending of Beams, Shearing force, Rigidity, Surface tension, Capillarity, Angle of contact, Excess pressure inside a bubble, Air bubbles in oil tank, Viscosity and viscous flow, Reynolds number.

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<b>2</b>	<b>Hydromechanics:</b>
	Pascal law and its applications, Total pressure on immersed surfaces, Law of Floatation, Archimedes principle and buoyancy, Flow in pipe lines, streamline and turbulence flow, Bernoulli's theorem and its applications.
<b>3</b>	<b>Instrumentation:</b>
	Calibration, Accuracy, Precision , Methods of measurement of temperature, pressure, Fluid flow, venturitube , venturimeter, sound level meter, thermister and its application as heat sensors, transducers.
<b>4</b>	<b>Network Theorems and its applications:</b>
	Kirchoff's Law, Classification of Network elements, Constant Voltage and Current Source, Nodal Analysis, Thevenin's Theorem, Maxwell Theorem, Superposition Theorem, Norton's Theorem, Millman' Theorem, Maximum power transfer Theorem, Applied Numericals.

### SECTION B: ELECTRONICS

<b>1</b>	<b>Semiconductors and Diodes:</b>
	Types of Semiconductors, p-n junction diodes – their characteristics, half-wave and full wave bridge rectifiers, Ripple, Capacitor filter , Zener Diode, its use as a voltage regulator, clipper, clamper, LDR and LED, Photo Electric Cell, Applied numericals.
<b>2</b>	<b>Transistors:</b>
	Bipolar-junction transistor, its characteristics and configurations, Transistor biasing, Current gain $\alpha$ and $\beta$ of a transistor, their relationship. Transistor as a switch. A.C and D.C load lines, Operating point, Emitter bias, Base bias, voltage divider bias, Bias Stabilization, Applied Numerical.
<b>3</b>	<b>Amplifiers:</b>
	CE amplifier, D.C and A.C equivalent circuit of CE amplifier, Frequency response. Cascading stages of amplifier, transistorised power amplifier, Negative and positive feedback amplifiers, Classification of amplifiers, Class A, B and C, RC coupled amplifiers, Push pull principle, Push pull power amplifier, Class-B push pull amplifier.



<b>4</b>	<b>Digital Electronics:</b>
	Basic logic gates such as OR and NOR gates using DTL and TTL circuits. NAND gates, NOR gates and XOR logic gates, Development of logic circuits, Universal logic gate, Boolean algebra, De-Morgan's theorem, Simplification of logic equation using Boolean theorems, Half adder, Full adder, Multiplexer and de multiplexer circuits. Introduction, Basic flip flop, RS flip flop, D-flip flop, JK flip flop, Counters, Binary ripple counters, decade counter.
<b>5</b>	<b>Modulation &amp; Demodulation :</b>
	Need of modulation, Amplitude modulation, modulation index, diode modulator, Frequency modulation, modulation index, side bands in F.M. Applied Problems. Demodulation of A.M.wave, Diode detector circuit, Detection efficiency, Demodulation of F.M. wave, Frequency demodulator, balanced slope detector, ratio detector, frequency distortion.

**Recommended Books for Reference:**

1. Advance level physics – Nelkon – Parker
2. Applied physics – J H Clough – Smith
3. Instrumentation – Devices & systems – Rangan, Mani Sharma
4. T.B. of Electrical Engg. – B.L. Theraja
5. Principles of Electronics – V.K. Mehta