National Defence Academy Examination & Naval Academy Examination

Eligibility : Educational - i) For Army Wing of NDA :- 12th Class pass of the 10+2 pattern of School Education or equivalent examination conducted by a State Education Board or a University   ii) For Air Force and Naval Wings of NDA and for 10+2 (Executive Branch) Course at Naval Academy : 12th Class pass of the 10+2 pattern of School Education or equivalent with Physics and Mathematics conducted by a State Education Board or a University. Candidates appearing at the 12th Class under the 10+2 pattern of School Education or equivalent examination also eligible to compete **Age**: 16-1/2 to 19 years as on 1st January.

A. SCHEME OF EXAMINATION

1. The subjects of the written examination, the time allowed and the maximum marks allotted to each subject will be as follows :–

Subject	Code	Duration	Maximum Marks
Mathematics	01	2-½ Hours	300
General Ability Test	02	2-½ Hours	600
		Total	900

2. THE PAPERS IN ALL THE SUBJECTS WILL CONSIST OF OBJECTIVE TYPE QUESTIONS ONLY. THE QUESTION PAPERS (TEST BOOKLETS) OF MATHEMATICS AND PART "B" OF GENERAL ABILITY TESTS WILL BE SET BILINGUALLY IN HINDI AS WELL AS ENGLISH. 3. In the question papers, wherever necessary, questions involving the metric system of Weights and Measures only will be set. 4. Candidates must write the papers in their own hand. In no circumstances will they be allowed the help of a scribe to write answers for them. 5. The Commission have discretion to fix qualifying marks in any or all the subjects at the examination. 6. The candidates are not permitted to use calculator or Mathematical or logirithmic table for answering objective type papers (Test Booklets). They should not therefore, bring the same inside the Examination Hall.

B. SYLLABUS OF THE EXAMINATION : PAPER-I   **Mathematics** (Code No. 01) (Maximum Marks - 300)

1. Algebra : Concept of a set, operations on sets, Venn diagrams. De Morgan laws. Cartesian product, relation, equivalence relation. Representation of real numbers on a line. Complex numbers - basic properties, modulus, argument, cube roots of unity. Binary system of numbers. Conversion of a number in decimal system to binary system and vice-versa. Arithmetic, Geometric and Harmonic progressions. Quadratic equations with real coefficients. Solution of linear inequations of two variables by graphs. Permutation and Combination. Binomial theorem and its application. Logarithms and their applications. **2.Matrices and Determinants**: Types of matrices, operations on matrices Determinant of a matrix, basic properties of determinant. Adjoint and inverse of a square matrix, Applications - Solution of a system of linear equations in two or three unknowns by Cramer's rule and by Matrix Method. **3.Trigonometry**: Angles and their measures in degrees and in radians. Trigonometrical ratios. Trigonometric identities Sum and difference formulae. Multiple and Sub-multiple angles. Inverse trigonometric functions. Applications - Height and distance, properties of triangles. **4.Analytical Geometry of two and three dimensions**: Rectangular Cartesian Coordinate system. Distance formula. Equation of a line in various forms. Angle between two lines.

Distance of a point from a line. Equation of a circle in standard and in general form. Standard forms of parabola, ellipse and hyperbola. Eccentricity and axis of a conic. Point in a three dimensional space, distance between two points. Direction Cosines and direction ratios. Equation of a plane and a line in various forms. Angle between two lines and angle between two planes. Equation of a sphere. **5.Differential Calculus**: Concept of a real valued function - domain, range and graph of a function. Composite functions, one to one, onto and inverse functions. Notion of limit, Standard limits - examples. Continuity of functions - examples, algebraic operations on continuous functions. Derivative of a function at a point, geometrical and physical interpreatation of a derivative - applications. Derivatives of sum, product and quotient of functions, derivative of a function with respect of another function, derivative of a composite function. Second order derivatives. Increasing and decreasing functions. Application of derivatives in problems of maxima and minima. **6.Integral Calculus and Differential equations**: Integration as inverse of differentiation, integration by substitution and by parts, standard integrals involving algebraic expressions, trigonometric, exponential and hyperbolic functions. Evaluation of definite integrals - determination of areas of plane regions bounded by curves - applications. Definition of order and degree of a differential equation, formation of a differential equation by examples. General and particular solution of a differential equation, solution of first order and first degree differential equations of various types - examples. Application in problems of growth and decay. **7. Vector Algebra** :_Vectors in two and three dimensions, magnitude and direction of a vector. Unit and null vectors, addition of vectors, scalar multiplication of vector, scalar product or dot product of two-vectors. Vector product and cross product of two vectors. Applications-work done by a force and moment of a force, and in geometrical problems. **8.Statistics and Probability** :- **Statistics**: Classification of data, Frequency distribution, cumulative frequency distribution - examples Graphical representation - Histogram, Pie Chart, Frequency Polygon - examples. Measures of Central tendency - mean, median and mode. Variance and standard deviation - determination and comparison. Correlation and regression. **Probability** : Random experiment, outcomes and associated sample space, events, mutually exclusive and exhaustive events, impossible and certain events. Union and Intersection of events. Complementary, elementary and composite events. Definition of probability - classical and statistical - examples. Elementary theorems on probability - simple problems. Conditional probability, Bayes' theorem - simple problems. Random variable as function on a sample space. Binomial distribution, examples of random experiments giving rise to Binominal distribution. **PAPER-II GENERAL ABILITY TEST** (Code No. 02) (Maximum Marks-600) Part 'A' - **ENGLISH** (Maximum Marks 200). The question paper in English will be designed to test the candidate's understanding of English and workman like use of words. The syllabus covers various aspects like : Grammar and usage, vocabulary, comprehension and cohesion in extended text to test the candidate's proficiency in English. Part 'B' - **GENERAL KNOWLEDGE** (Maximum Marks-400)

The question paper on General Knowledge will broadly cover the subjects : Physics, Chemistry, General Science, Social Studies, Geography and Current Events. The syllabus given below is designed to indicate the scope of these subjects included in this paper. The topics mentioned are not to be regarded as exhaustive and questions on topics of similar nature not specifically mentioned in the syllabus may also be asked. Candidate's answers

are expected to show their knowledge and intelligent understanding of the subject.
Section 'A' (Physics) Physical Properties and States of Matter, Mass, Weight, Volume, Density and Specific Gravity, Principle of Archimedes, Pressure Barometer.

Motion of objects, Velocity and Acceleration, Newton's Laws of Motion, Force and Momentum, Parallelogram of Forces, Stability and Equilibrium of bodies, Gravitation, elementary ideas of work, Power and Energy. Effects of Heat, Measurement of temperature and heat, change of State and Latent Heat, Modes of transference of Heat. Sound waves and their properties, Simple musical instruments. Rectilinear propagation of Light, Reflection and refraction. Spherical mirrors and Lenses. Human Eye. Natural and Artificial Magnets, Properties of a Magnet, Earth as a Magnet. Static and Current Electricity, conductors and Non-conductors, Ohm's Law, Simple Electrical Circuits, Heating, Lighting and Magnetic effects of Current, Measurement of Electrical Power, Primary and Secondary Cells, Use of X-Rays. General Principles in the working of the following : Simple Pendulum, Simple Pulleys, Siphon, Levers, Balloon, Pumps, Hydrometer, Pressure Cooker, Thermos Flask, Gramophone, Telegraphs, Telephone, Periscope, Telescope, Microscope, Mariner's Compass; Lightening Conductors, Safety Fuses. **Section 'B' (Chemistry)** Physical and Chemical changes. Elements, Mixtures and Compounds, Symbols, Formulae and simple Chemical Equations, Law of Chemical Combination (excluding problems). Properties of Air and Water. Preparation and Properties of Hydrogen, Oxygen, Nitrogen and Carbondioxide, Oxidation and Reduction. Acids, bases and salts.

Carbon - different forms. Fertilizers - Natural and Artificial Material used in the preparation of substances like soap, Glass, Ink, Paper, Cement, Paints, Safety Matches, and Gun-Powder. Elementary ideas about the Structure of Atom, Atomic, Equivalent and Molecular Weights, Valency. **Section 'C' (General Science)** Difference between the living and non- living. Basis of Life - Cells, Protoplasms and Tissues. Growth and Reproduction in Plants and Animals. Elementary knowledge of human Body and its important organs. Common Epidemics, their causes and prevention. Food - Source of Energy for man. Constituents of food, Balanced Diet. The Solar System - Meteors and Comets, Eclipses. Achievements of Eminent Scientists. **Section 'D' (History, Freedom Movement etc.)** A broad survey of Indian History, with emphasis on Culture and Civilisation. Freedom Movement in India. Elementary study of Indian Constitution and Administration. Elementary knowledge of Five Year Plans of India. Panchayati Raj, Co-operatives and Community Development. Bhoodan, Sarvodaya, National Integration and Welfare State, Basic Teachings of Mahatma Gandhi. Forces shaping the modern world; Renaissance, Exploration and Discovery; War of American Independence. French Revolution, Industrial Revolution and Russian Revolution. Impact of Science and Technology on Society. Concept of one World, United Nations, Panchsheel, Democracy. Socialism and Communism. Role of India in the present world. **Section 'E' (Geography)** The Earth, its shape and size. Lattitudes and Longitudes, Concept of time. International Date Line. Movements of Earth and their effects. Origin of Earth. Rocks and their classification; Weathering - Mechanical and Chemical, Earthquakes and volcanoes. Ocean Currents and Tides Atmosphere and its composition; Temperature and Atmospheric Pressure, Planetary Winds, cyclones and Anti-cyclones; Humidity; Condensation and Precipitation; Types of Climate. Major Natural regions of the World. Regional Geography of India - Climate, Natural vegetation. Mineral and Power

resources; location and distribution of agricultural and industrial activities. Important Sea ports and main sea, land and air routes of India. Main items of Imports and Exports of India. **Section 'F' (Current Events)** Knowledge of Important events that have happened in India in the recent years. Current important world events. Prominent personalities - both Indian and International including those connected with cultural activities and sports. **NOTE** : Out of maximum marks assigned to part 'B' of this paper, questions on Sections 'A', 'B', 'C', 'D', 'E' and 'F' will carry appoximately 25%, 15%, 10%, 20%, 20% and 10% weightages respectively. **Intelligence and personality test** : In addition to the interview the candidates will be put to Intelligence Tests both verbal and non-verbal, designed to assess their basic intelligence. They will also be put to Group Tests such as group discussions, group planning, outdoor group tasks, and asked to give brief lectures on specified subjects. All these tests are intended to judge the mental calibre of a candidate. In broad terms, this is really an assessment of not only his intellectual qualities but also his social traits and interests in current affairs. **GUIDELINES FOR PHYSICAL STANDARDS FOR ADMISSION TO THE N. D. A :** Spinal Conditions Vision standard for Naval & Air Force candidates GUIDELINES FOR PHYSICAL STANDARDS FOR ADMISSION TO THE NATIONAL DEFENCE ACADEMY Note : CANDIDATES MUST BE PHYSICALLY AND MENTALLY FIT ACCORDING TO THE PRE-SCRIBED PHYSICAL STANDARDS. THE GUIDELINES FOR THE SAME ARE GIVEN BELOW. A NUMBER OF QUALIFIED CANDIDATES ARE REJECTED SUBSEQUENTLY ON MEDICAL GROUNDS. CANDIDATES ARE THEREFORE ADVISED IN THEIR OWN INTEREST TO GET THEMSELVES MEDICALLY EXAMINED BEFORE SUBMITTING THEIR APPLICATIONS TO AVOID DISAPPOINTMENT AT THE FINAL STAGE. Candidates are also advised to rectify minor defects/ailments in order to speed up finalisation of medical examination conducted at the Military Hospital after being recommended at the SSB. The undermentioned ailments are considered, common minor ailments : (a) Wax (Ears) (b) Deviated Nasal Septum (c) Hydrocele/Phimosis (d) Overweight/Underweight (e) Under sized Chest (f) Piles (g) Gynaecomastia (h) Tonsillitis (i) Varicocele Civilian candidates appearing for all types of commission in the Armed Forces will be entitled to out-patients treatment from service sources at public expense for injuries sustained or diseases contracted during the course of their examination by the Selection Board. They will also be entitled to in-patient treatment at public expense in the Officers's ward of a hospital provided– (a) the injury is sustained during the tests or, (b) the disease is contracted during the course of the examination by selection board and there is no suitable accommodation in local civil hospital or it is impracticable to remove the patient to the civil hospital; or, (c) the medical board requires the candidates's admission for observation. **NOTE** : They are not entitled to special nursing. A candidate recommended by the Services Selection Board will undergo a medical examination by a Board of Service Medical Officers. Only those candidates will be admitted to the academy who are declared fit by the Medical Board. The proceedings of the Medical Board are confidential and will not be divulged to anyone. However the candidates declared unfit will be intimated by the President of the Medical Board and the procedure for request for an Appeal Medical Board will also be intimated to the candidate. Candidates declared unfit during Appeal Medical Board will be intimated about the provision of Review Medical Board. (a) The candidate must be in good physical and mental health and free from any

disease/disability which is likely in interfere with the efficient performance of military duties. (b) There should be no evidence of weak constitution, bodily defects or under weight. The candidate should not be overweight or obese. (c) The minimum acceptable height is 157.5 cms. (162.5 cms for Air Force) For Gorkhas and individuals belonging to hills of North Eastern regions of India, Garhwal and Kumaon, the minimum acceptable heights will be 5 cms. less. In case of candidates from Lakshadweep the minumum acceptable height can be reduced by 2 cms. Height and weight standards are given below :

Height/Weight Standards for Army/Air Force
TABLE-I

Height in Centimetres (Without shoes)	Weight in Kgs.		
	16-17 years	17-18 years	18-19 years
152	42.5	44	45
155	43.5	45.5	47
157	45	47	48
160	46.5	48	49
162	48	50	51
165	50	52	53
167	51	53	54
170	52.5	55	56
173	54.5	57	58
175	56	59	60
178	58	61	62
180	60	63	64.5
183	62.5	65	66.5

HEIGHT/WEIGHT STANDARDS FOR NAVY
TABLE-II

Height in Centimetres (Without shoes)	Weight in Kgs.		
	16 years	18 years	20 years
152	44	45	46
155	45	46	47
157	46	47	49
160	47	48	50
162	48	50	52
165	50	52	53
168	52	53	55
170	53	55	57
173	55	57	59
175	57	59	61
178	59	61	62
180	61	63	64
183	63	65	67

A ± 10% (A ± 6 Kg for Navy) departure from the average weight given in the table 1 above is to be considered within normal limit. However, in individuals with heavy bones and broad build as well as individuals with thin but otherwise healthy this may be relaxed to some extent on merit. **NOTE 1** : Height relaxable upto 2.5 cm (5 cm. for Navy) may be allowed where the Medical Board certifies that the candidate is likely to grow and come up to the required standard on completion of his training. **NOTE 2** : To meet special requirement as a pilot in the Air Force the acceptable measurements of leg length, thigh length and sitting height will be as under :–

	Minimum	Maximum
Leg Length	99.00cms.	120.00 cms.
Thigh Length	–	64.00 cms.
Sitting Height	81.50cms.	96. 00 cms.

On account of lower age of NDA candidates, a margin of upto 5.0 cm. in height, 2.5 cm. in leg length (minimum) and 1.0 cm. sitting height (minimum) may be given provided it is certified by the Medical Board that the candidate is likely to grow and come upto the required standard on completion of his training in NDA. (d)Chest should be well developed. Fully expanded chest should not be less than 81 cms. The minimum range of expansion after full inspiration should be 5 cms. The measurement will be taken with a tape so adjusted that its lower edge should touch the nipple in front and the upper part of the tape should touch the lower angle of the shoulder blades behind. X-Ray of the chest is compulsory and will be taken to rule out any disease of the chest. (e)   There should be no mal-development or impairment of function of the bones or joint.