NARAYANA
IIT-JEE / NEET / FOUNDATIONS
(A Unit of NSPIRA Management Services Pvt. Ltd.)

NSAT
NARAYANA SCHOLASTIC APTITUDE TEST
ASPIRE • ASSESS • ACHIEVE

NSAT-2024

CLASS – XI (Botany, Zoology, Physics & Chemistry)
(Class XI Moving to XII-PCB)

NARAYANA SCHOLASTIC APTITUDE TEST (NSAT)

SAMPLE PAPER

Time: 1:00 Hr. ***Maximum marks: 160***

IMPORTANT INSTRUCTIONS:

1. **The test Booklet consists of 40 questions. The maximum marks are 160.**
2. **There are five parts in the question paper of Botany (Q. No. 1 to 10), Zoology (Q. No. 11 to 20), Physics (Q. No. 21 to 30) & Chemistry (Q. No. 31 to 40) having 40 questions. Each question is allotted +4 (four) marks for each correct response & -1 for each incorrect answer**
3. **Mark only one correct answer out of four alternatives.**
4. **Use Blue/Black Ball Point Pen only for writing particulars/marking.**
5. **Use of Calculator is not allowed.**
6. **Dark the circle in the space provided only.**
7. **Use of white fluid or any other material which damage the answer sheet, is not permissible on the Answer Sheet.**

TO BE FILLED IN CAPITAL LETTERS

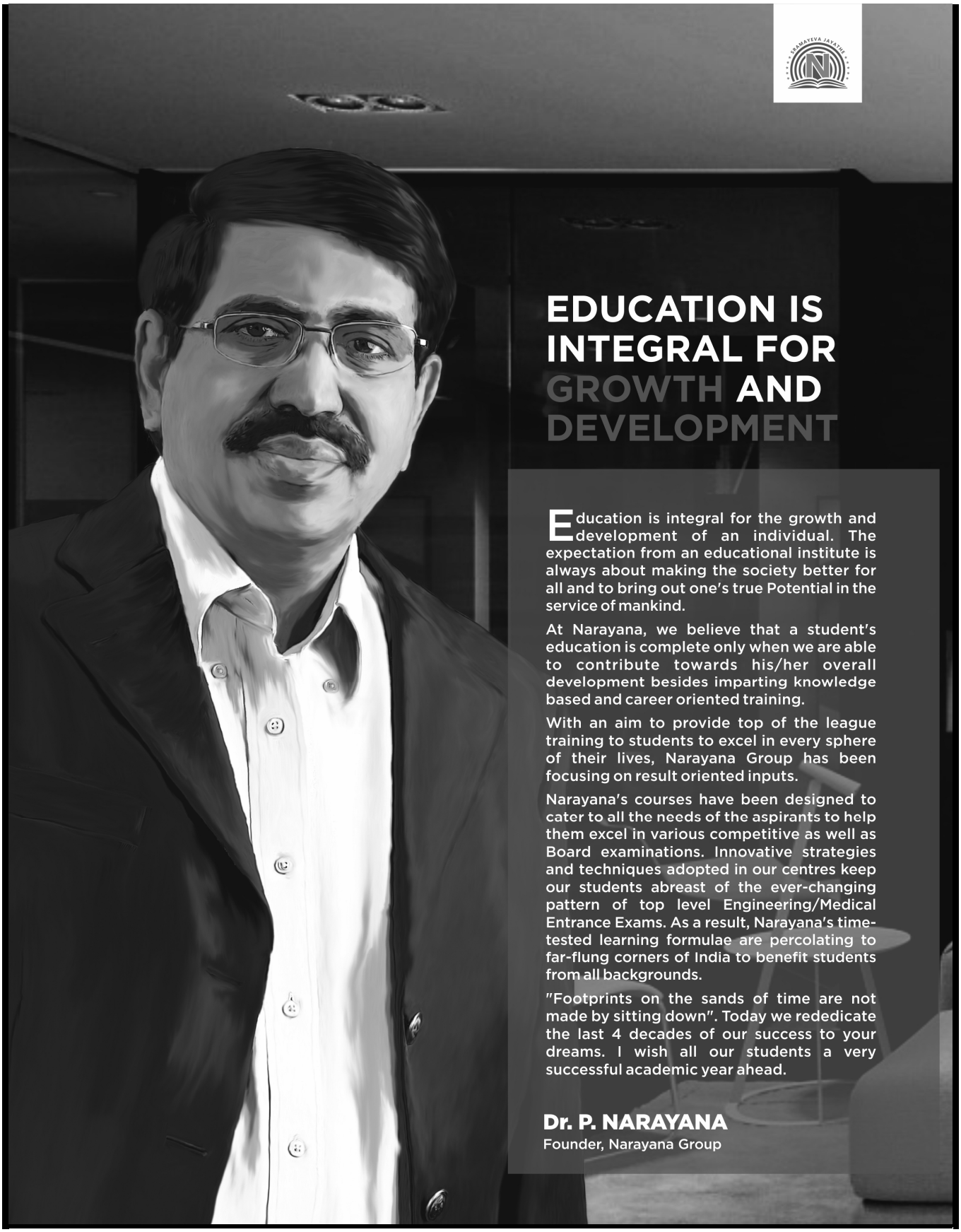
NAME OF THE STUDENT : _____

FATHER'S NAME : _____

CONTACT NUMBERS:_____SCHOOL NAME : _____

ROLL NO. :_____TEST CENTRE : _____

I have read all the instructions and shall abide by them	I have verified all the information filled in by the Candidate
……..……	……
Signature of the Candidate	Signature of the Invigilator



EDUCATION IS INTEGRAL FOR GROWTH AND DEVELOPMENT

Education is integral for the growth and development of an individual. The expectation from an educational institute is always about making the society better for all and to bring out one's true Potential in the service of mankind.

At Narayana, we believe that a student's education is complete only when we are able to contribute towards his/her overall development besides imparting knowledge based and career oriented training.

With an aim to provide top of the league training to students to excel in every sphere of their lives, Narayana Group has been focusing on result oriented inputs.

Narayana's courses have been designed to cater to all the needs of the aspirants to help them excel in various competitive as well as Board examinations. Innovative strategies and techniques adopted in our centres keep our students abreast of the ever-changing pattern of top level Engineering/Medical Entrance Exams. As a result, Narayana's time-tested learning formulae are percolating to far-flung corners of India to benefit students from all backgrounds.

"Footprints on the sands of time are not made by sitting down". Today we rededicate the last 4 decades of our success to your dreams. I wish all our students a very successful academic year ahead.

Dr. P. NARAYANA
Founder, Narayana Group

BOTANY

1. Cells acquire and use energy to synthesize, store, degrade and eliminate substances through chemical reactions called

(A) metastasis (B) respiration

(C) metabolism (D) homeostasis

2. The term 'Taxonomy' was first proposed by the Swiss botanist:

(A) Lamarck (B) Nageli

(C) A.P. de Candolle (D) Linnaeus

3. Match the following

Column – I (Group of bacteria)	**Column – II (Their shape)**
a. *Coccus*	(i) Rod-shaped
b. *Bacillus*	(ii) Spherical
c. *Spirillum*	(iii) Spiral
d. *Vibrium*	(iv) Comma-shaped

(A) a – i, b – ii, c – iii, d - iv

(B) a – ii, b – i, c – iii, d – iv

(C) a – i, b – ii, c – iv, d - iii

(D) a – ii, b – i, c – iv, d - iii

4. Highly resistance nature of endospore is due to the presence of

(A) Dipicolinic acid and peptidoglycan in spore coat

(B) Peptidoglycan in exosporium

(C) Dipicolinic acid and Ca^{++} in cortex

(D) Dipicolinic acid and Ca^{++} in cell membrane

5. A swollen leaf base in some legumes is called :

(A) Pulvinus (B) Lamina

(C) Stipule (D) Ligule

6. Racemose inflorescence is identified by -

(A) Acropetal arrangement of flowers on peduncle

(B) Presence of sessile flowers

(C) Continuous growth of main axis

(D) Both (A) and (C)

Space for rough work

7. Stilt roots :
(A) Arise from horizontally placed aerial branches
(B) Develops from the basal node of the stem
(C) Are hygroscopic
(D) Act like pillars and provide support to aerial branches

8. Which of the following phases of the cell cycle is not a part of interphase?
(A) S (B) G_1 (C) G_2 (D) M

9. Ribosomes take part in protein synthesis in
(A) Viruses (B) Prokaryotes only
(C) Both prokaryotes and eukaryotes (D) Eukaryotes only

10. Subunits of 80S ribosomes are
(A) 40S (B) 60S (C) 40S and 60S (D) None of the above

Space for rough work

ZOOLOGY

11. The most common secondary structure of protein is
(A) β- Pleated sheet (B) β- Pleated sheet parallel
(C) β- Pleated sheet non-parallel (D) α-helix

12. Macromolecule chitin is
(A) Nitrogen containing polysaccharide
(B) Phosphorous containing polysaccharide
(C) Sulphur containing polysaccharide
(D) None of these

13. A spirometer cannot be used to measure :-
(A) IC (B) RV (C) ERV (D) IRV

14. Respiratory centre of brain is stimulated by –
(A) CO_2 content in venous blood
(B) CO_2 content in arterial blood
(C) O_2 content in arterial blood
(D) O_2 content in venous blood

15. Which of the following has least urea?
(A) Hepatic vein (B) Renal vein
(C) Pulmonary vein (D) Hepatic portal vein

16. Joint diastole phase of the cardiac cycle is in between
(A) 'Dup' and 'Lubb' sound
(B) 'Lubb' and 'Dup' sound
(C) Beginning of auricular systole and end of ventricular systole
(D) None of these

17. Value of cardiac output is
(A) Auricular volume × ventricular volume
(B) Stroke volume × rate of heat beat
(C) Blood pumped in one minute
(D) Both B and C

18. In which part of nephron, the glomerular filtrate becomes hypotonic?
(A) PCT (B) Descending limb of loop of Henle
(C) Ascending limb of loop of Henle (D) Both (A) and (B)

Space for rough work

19. Which of the following statements about the mechanism of muscle contraction are correct?
(i) Acetylcholine is released when the neural signal reaches the motor end plate.
(ii) Muscle contraction is initiated by a signal sent by CNS via a sensory neuron.
(iii) During muscle contraction, isotropic band gets elongated.
(iv) Repeated activation of the muscles can lead to lactic acid accumulation.
(A) (i) and (iv) (B) (i) and (iii)
(C) (ii) and (iii) (D) (i), (ii) and (iii)

20. Which one of the following is showing the correct sequential order of vertebrae in the vertebral column of human beings?
(A) Cervical-Lumbar-Thoracic-Sacral-Coccygeal
(B) Cervical-Thoracic-Sacral-Lumbar-Coccygeal
(C) Cervical-Sacral-Thoracic-Lumbar-Coccygeal
(D) Cervical-Thoracic-Lumbar-Sacral-Coccygeal

Space for rough work

PHYSICS

21. A particle has an initial speed of $\left(3\hat{i}+4\hat{j}\right)$ and acceleration $\left(0.4\hat{i}+0.3\hat{j}\right)$. Its speed after 10 s is

(A) 8.5 units (B) 10 units (C) 7 units (D) $7\sqrt{2}$ units

22. Two bodies of mass m and 2 m have equal kinetic energy. What is the ratio of their momenta?

(A) 1: 2 (B) 1:3 (C) 1:1 (D) $1:\sqrt{2}$

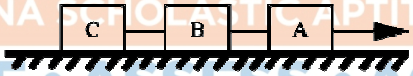
23. A bullet of mass m moving with a speed ν strikes a stationary wooden block of mass M and gets embedded into the block. The final speed is

(A) $\sqrt{\left(\frac{M}{M+m}\right)}v$ (B) $\sqrt{\frac{m}{M+m}}\times v$ (C) $\frac{m}{M+m}\times v$ (D) v/2

24. If the normal reaction is doubled, the coefficient of friction

(A) becomes doubled (B) becomes quadrupled
(C) remains the same (D) is halved

25. Three identical blocks, each of mass m = 2 kg , are drawn by a force F = 10.2 N on frictionless surface. What is the tension (in N) in the string between the blocks A and B?



(A) 9.2 (B) 6.8 (C) 4 (D) 9.8

26. A solid sphere of mass M and radius R rolls on a horizontal surface without slipping. The ratio of rotational kinetic energy to total kinetic energy is

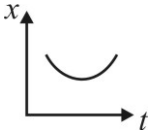
(A) ½ (B) 3/7 (C) 2/7 (D) 2/10

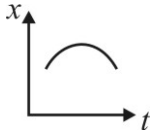
27. The velocity of a particle (v) at an instant t is given by $v = at + bt^2$. The dimension of b is

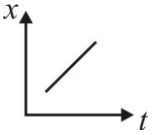
(A) [L] (B) $[LT^{-1}]$ (C) $[LT^{-2}]$ (D) $[LT^{-3}]$

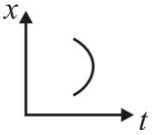
Space for rough work

28. Position-time graph for motion with zero acceleration is

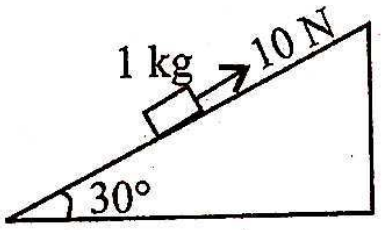
(A) 

(B) 

(C) 

(D) 

29. A block of mass 1 kg is pushed up a surface inclined to horizontal at an angle of 30^0 by a force of 10 N parallel to the inclined surface as shown in the figure. The coefficient of friction between block and the incline is 0.1. If the block is pushed up by 10 m along the incline, then the work against gravity is (Take g =10 ms^{-2})



(A) 10 J (B) 50 J (C) 100 J (D) 150 J

30. The instantaneous angular position of a point on a rotating wheel is given by the equation $\theta(t) = 2t^3 - 6t^2$. The torque on the wheel becomes zero at

(A) t =1s (B) t = 0.5 s (C) t = 0.25 s (D) t = 2 s

Space for rough work

CHEMISTRY

31. Atomic weight of chlorine is 35.5 . It has two isotopes of atomic weight 35 and 37. What is percentage of the heavier isotope in the sample?
(A) 5 (B) 10 (C) 25 (D) 20

32. Elements A and B form two compounds B_2A_3 and B_2A. Given that 0.05 moles of B_2A_3 weight 9.0 g and 0.10 mole of B_2A weight 10 g . Atomic weight of A and B are –
(A) 20 and 30 (B) 30 and 40 (C) 40 and 30 (D) 30 and 20

33. Among the following ions, the pπ - dπ overlap could be present in
(A) NO_3^- (B) SO_3^{2-} (C) CO_3^{2-} (D) NO_2^-

34. A ball of mass 200 gm is moving with velocity of 10 ms^{-1} . If the error in measurement of velocity is 0.1%, the uncertainity in its position is
(A) 3.3×10^{-31} m (B) 3.3×10^{-27} m (C) 5.3×10^{-25} m (D) 2.62×10^{-32} m

35. If the uncertainty in the position of an electron is zero, the uncertainty in its momentum would be
(A) zero (B) greater than h / 4 p (C) less than h / 4 p (D) infinite

36. In Bohr's atomic model, radius and energy in orbit is related as :-
(A) $r\alpha n^2$, $E\alpha -\frac{1}{n^2}$ (B) $r\alpha \frac{1}{n^2}$, $E\alpha -n^2$
(C) $r\alpha \frac{1}{n}$, $E\alpha n$ (D) $E\alpha n^2$, $r\alpha n^2$

37. Molecule having maximum number of covalent bonds is
(A) NH_4OH (B) NH_4Cl (C) $CO(NH_2)_2$ (D) CH_3OH

38. Which one of the following has been arranged in order of increasing covalent character?
(A) $KCl < CaCl_2 < AlCl_3 < SnCl_4$ (B) $SnCl_4 < AlCl_3 < CaCl_2 < KCl$
(C) $AlCl_3 < CaCl_2 < KCl < SnCl_4$ (D) $CaCl_2 < SnCl_4 < KCl < AlCl_3$

39. Given that $Zn+\frac{1}{2}O_2 \rightarrow ZnO + 35.25kJ$. $HgO \rightarrow Hg+\frac{1}{2}O_2 - 9.11KJ$. The enthalpy of the reaction $Zn + HgO \rightarrow ZnO + Hg$ is
(A) -26.14 KJ (B) 44.39 KJ (C) -44.39 KJ (D) 26.14 KJ

40. One mole of an ideal gas is allowed to expand reversibly and adiabatically from temperature of 27^0C. If the work done during the process is 3 KJ , the final temperature will equal to ($C_v = 20\ JK^{-1}$)
(A) 100 K (B) 150 K (C) 295 (D) 26.85oC

Space for rough work