NATIONAL TALENT SEARCH EXAMINATION, 2015-16 (STATE LEVEL) (FOR STUDENTS STUDYING IN CLASS X)
SAT QUESTION

Time: 1 Hrs.   *Full Marks: 100*

INSTRUCTIONS TO CANDIDATES

Read the instructions carefully before you start answering the questions. Answers are to be given on a OMR Answer-Sheet provided.

1. In this Paper you are to answer 100 questions. Each questions carries 1 (one) mark. You are to answer all the questions.

2. Before you proceed to mark in the OMR answer-Sheet, find out the correct answer from the four alternatives (a), (b), (c) and (d) against each question in the Question Booklet. Darken the circle with a Black Ball Point Pen, to the corresponding correct answer for the item in the OMR Answer-Sheet. (Here 'b' is the correct answer.)

3. If more than one circle is encoded or darken against a particular answer, it will be treated as a wrong answer.

4. There will be no penalty marks or negative marking for a wrong answer.

5. You are to start recording answers with the 'start' instruction from the Officer-in-Charge of your room/hall.

6. You are to write your Name and Roll No. in the space provided with for this purpose on the OMR Answer-Sheet. You must encode your Roll No. in OMR Answer Sheet.

7. The OMR Answer-Sheet should be handed over to the Invigilator before leaving the Examination Hall. You may take away the used Question Booklet after completion of the examination.

Enrollment No. : ☐☐☐☐ ☐☐ ☐☐ ☐☐☐   **Batch :** _____

Name : _____

Candidate's Signature _____   **Invigilator's Signature:** _____

# MATHEMATICS

1. If $f\left(2x+\dfrac{1}{x}\right)=x^2+\dfrac{1}{4x^2}+1\,(x\neq0)$, the value of f(x) is

   (a) $4x^2$ (b) $\dfrac{1}{4}\left(2x+\dfrac{1}{x}\right)^2$ (c) $\dfrac{1}{4}x^2$ (d) $4\left(2x+\dfrac{1}{x}\right)^2$

2. If $x-2\sqrt{x}=3$, then the value of x is
   (a) 1   (b) 3   (c) 9   (d) − 1

3. The value of $\sqrt{5-2\sqrt{6}}$ is
   (a) $\pm\left(\sqrt{3}-\sqrt{2}\right)$ (b) $\sqrt{3}-\sqrt{2}$ (c) $\sqrt{2}-\sqrt{3}$ (d) All of the above

4. If $x=ay,\,y=bx,$ the value of $\dfrac{1}{a+1}+\dfrac{1}{1+b}$ is

   (a) 0   (b) x + y   (c) $\dfrac{1}{x+y}$ (d) 1

5. The least value of $2x^2-4x+3y^2-18y+31$ is
   (a) 3   (b) − 1   (c) 0   (d) 2

6. If $2r=h+\sqrt{r^2+h^2}$, the value of r : h is $(r,h\neq0)$
   (a) 4 : 3   (b) 3 : 4   (c) 1 : 2   (d) 2 : 1

7. If x = cy + bz, y = cx + az, z = bx + ay, the value of $a^2+b^2+c^2-1$ is
   (a) abc   (b) − abc   (c) 2abc   (c) − 2abc

8. If $x(x^3-1)<0$, then
   (a) x < 0   (b) 0 < x < 1   (c) x > 1   (d) None of the above

9. Among the numbers 2^{250}, 3^{200}, 4^{150} and 5^{100}, the greatest is
   (a) 2^{250} (b) 3^{200} (c) 4^{150} (d) 5^{100}

10. If a*b = a + b − ab, the value of 4 * 5 + 5 * 6 is
    (a) 20   (b) − 20   (c) 30   (d) − 30

11. When the rate of interest being increased from 10% to $12\dfrac{1}{2}\%$, the yearly income of a person increases by Rs. 1,250. The principal amount was
    (a) Rs. 50,000   (b) Rs. 5,000   (c) Rs. 15,000   (d) 37,500

12. A man sells two articles each at Rs. 198. He makes a profit of 10% on one article and a loss of 10% on the other. Net profit or loss of the person
    (a) 2% profit   (b) 2% loss   (c) 1% profit   (d) 1% loss

13. The price of a house is Rs.6,76,000. If the price increases every year by 4%, before two years back the price of the house was
    (a) Rs. 6,00,000   (b) Rs. 6,25,000   (c) Rs. 6,50,000   (d) Rs. 5,75,000

14. 'O' is any point inside the rectangle PQRS, then
    (a) $OP^2+OR^2=OQ^2+OS^2$ (b) $OP^2+OQ^2=OR^2+OS^2$
    (c) $OP^2+OS^2=OQ^2+QR^2$ (d) None of the above

15. The vertical angles of two isosceles triangles are equal. If the ratio of the areas is 9 : 16, the ratio of the heights of the triangle is
    (a) 9 : 16   (b) 16 : 9   (c) 3 : 4   (d) 4 : 3

16. If the edge of a regular tetrahedron is 1 cm, then its volume is
    (a) $\frac{1}{12}$ cm^3 (b) $\frac{\sqrt{2}}{6}$ cm^3 (c) $\frac{\sqrt{2}}{12}$ cm^3 (d) $\frac{\sqrt{2}}{4}$ cm^3

17. The length, breadth and height of a solid rectangular parallelepiped made of copper are 11 cm, 9 cm and 6 cm respectively. How many coins of radius 1.5 cm having thickness 0.25 cm can be produced by melting it?
    (a) 168   (b) 170   (c) 336   (d) 340

18. If $\sin^2 A + \sin^4 A = 1$, the value of $\tan^2 A - \tan^4 A$ is
    (a) – 1   (b) 1   (c) 0   (d) 2

19. The least value of $2^{\sin^2 x} + 2^{\cos^2 x}$ is
    (a) 4   (b) $2\sqrt{2}$ (c) 2   (d) $\sqrt{2}$

20. If ABCD is a cyclic quadrilateral, the value of $\tan\dfrac{A}{2}\tan\dfrac{C}{2} + \tan\dfrac{B}{2}\tan\dfrac{D}{2}$ is
    (a) 0   (b) 1   (c) – 1   (d) 2

PHYSICS

21. The linear momentum 'p' of a body having mass 'm' and kinetic energy 'E' is
    (a) $p = \sqrt{2mE}$ (b) $p = \sqrt{E/2m}$ (c) $p = \sqrt{2m/E}$ (d) $p = \sqrt{mE}$

22. In the adjacent V – T diagram what is the relation between pressures P_1 and P_2?
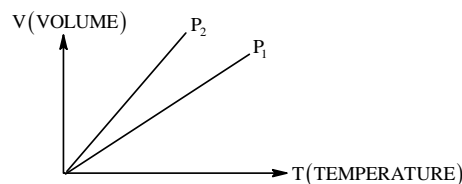
    (a) $P_2 = P_1$ (b) $P_2 > P_1$ (c) $P_2 < P_1$ (d) Cannot be predicted

23. A musical instrument has tones of frequencies 256 Hz, 502 Hz, 1020 Hz and 1280 Hz. The frequencies of the fundamental and its harmonic are given by
    (a) 256 Hz and 502 Hz respectively   (b) 256 Hz and 1020 Hz respectively
    (c) 502 Hz and 1020 Hz respectively   (d) 256 Hz and 1280 Hz respectively

24. The total energy of a particle executing Simple Harmonic Motion of amplitude 'A' is proportional to
    (a) A^2 (b) A^{-2} (c) A   (d) 1/A

25. Refractive index of a medium with respect to air is $\mu = \sqrt{2}$, find the critical angle between the two medium
    (a) 30° (b) 90° (c) 45° (d) 60°

26. What will be the colour of the sky as seen from the earth if there is no atmosphere?
    (a) Black   (b) Blue   (c) Orange   (d) Red

27. A convex lens of glass has power P in air. If it is immersed in water, its power will be
    (a) more than P
    (b) less than P
    (c) P
    (d) More the P for some colours and less than P for others

28. Two electrodes are maintained at a potential difference of 100 V. An electron moving from cathode to anode gains kinetic energy
    (a) 160×10^{-19} Erg   (b) 100 Joule   (c) 160×10^{-19} Joule   (d) 100 Erg

29. In a transformer, the number of turns in the primary is 4 A then the current in the secondary is
    (a) 4 A   (b) 2 A   (c) 6 A   (d) 10 A

30. What is the equivalent resistance between any two vertex of a triangle if the sides of the triangle are of equal resistance?
    (a) 3R   (b) 2R   (c) R   (d) 2R/3

31. Fill in the gap
    $_{12}Mg^{25} + _{1}H^{1} \rightarrow _{11}Na^{22} + \_\_\_\_\_$
    (a) $_{1}H^{1}$ (b) $_{2}He^{4}$ (c) $_{1}H^{3}$ (d) $_{1}H^{2}$

32. Gamma ray is highly energetic
    (a) Electron   (b) Proton
    (c) Electromagnetic wave   (d) Neutron

33. The radius of the nucleus of an atom of mass number A is proportional to
    (a) $A^{3/4}$ (b) $A^{2/3}$ (c) $A^{1/3}$ (d) $A^{5/3}$

CHEMISTRY

34. The number of atoms in 0.1 mole of a triatomic gas is
    (a) 6.026×10^{22} (b) 1.806×10^{23} (c) 3.6×10^{23} (d) 1.8×10^{22}

35. An ion with mass number 56 contains 3 units of positive charge and 30.4% more neutrons than electrons. Atomic number of the element is
    (a) 24   (b) 25   (c) 26   (d) 27.

36. Which of the following orders of ionic radii is correctly represented?
    (a) $H^{-} > H^{+} > H$ (b) $Na^{+} > F^{-} > O^{2-}$ (c) $F^{-} > Na^{+} > O^{2-}$ (D) $H^{-} > H > H^{+}$

37. In the structure of Napthalene the difference between the number of sigma bonds and the number of pi bond is
    (a) 6   (b) 7   (c) 12   (d) 14.

38. x mole of oxygen gas is kept in a container of definite volume at a pressure of P atmosphere at TK. At the same temperature another y mole of oxygen gas introduced in that container. The total pressure will be
    (a) x(1 + y)P   (b) $\dfrac{xP}{x+y}$ (c) $\dfrac{yP}{x+y}$ (d) $\left(\dfrac{x+y}{x}\right)P.$

39. 0.25 mole of a hydrocarbon requires 0.5 mole of hydrogen for complete saturation. Possible formula of the hydrocarbon is
    (a) C_3H_8 (b) C_3H_6 (C) C_4H_8 (d) $C_3H_4.$

40. Which of the following pair of compounds represent functional group isomerism?
    (a) Diethyl ether and ethanol   (b) dimethyl ether and ethanol
    (c) Acetadehyde and Propanal   (d) Isobutane and Butane.

41. Extraction of highly electropositive metal is done by
    (a) Electrolysis of aqueous solution of metal chloride
    (b) Electrolysisi of molten metal chloride.
    (c) Carbon reduction of the oxide of the metal
    (d) Strongly heating the oxide of the metal.

42. Which one is a Redox reaction?
    (a) $HCl + AgNO_3 = AgCl + HNO_3$ (b) $NaBr + HCl = NaCl + HBr$
    (c) $Na_2O + H_2SO_4 = Na_2SO_4 + H_2O$ (d) $H_2 + Br_2 = 2HBr.$

43. Some amount of air is kept in an open container at 27°C. At what temperature the container should be heated in order to eliminate $\frac{3}{8}th$ part of the air from the container?

    (a) 307°C   (b) 207°C   (c) 107°C   (d) 100°C.

44. What is the pH of 0.005 (M) H_2SO_4 solution?
    (a) 3   (b) 4   (c) 2   (d) 5.

45. $_y^x A$ and $_q^p B$ are isotopes. Which equation is correct regarding the two atoms?

    (a) $\left(x^2 - p^2\right)\left(y^2 - q^2\right) = 0$ (b) $\left(x^2 + p^2\right)\left(y^2 + q^2\right) = 0$

    (c) $\left(x^2 - q^2\right)\left(y^2 - p^2\right) = 0$ (d) $\left(x^2 + q^2\right)\left(y^2 + p^2\right) = 0$.

46. A mixture of CH_4, C_2H_4 and C_2H_2 is passed through a basic copper (I) chloride solution. Which gas/gases will come out?
    (a) Whole mixture   (b) CH_4 and C_2H_2 (c) CH_4 and C_2H_4 (d) C_2H_4.

BIOLOGY

47. In Mandelian monohybrid cross how many offsprings of recessive character will appear in F_2 generation out ot total progeny?

    (a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$.

48. Various trophic levels of an ecological pyramid given below have been indicated as T_1, T_2, T_3 and T_4. In which trophic level maximum energy will be available?
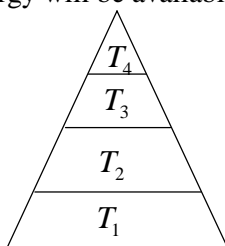
    (a) T_4 (b) T_3 (c) T_2 (d) T_1.

49. How many carbon is present in Acetyl COA?
    (a) Four   (b) One   (c) Three   (d) Two.

50. Antibodies are complex
    (a) Lipoproteins   (b) Steroids   (c) Prostaglandins   (d) Globulin Proteins.

51. Podocyte cell is found in human
    (a) Glomerulus   (b) Bowman's Capsule   (c) Cerebrum   (d) Cerebellum.

52. The simplest amino acid is
    (a) Lysine   (b) Leucine   (c) Glycine   (d) Methionine

53. Gastric juice contains
    (a) Pepsin and trypsin   (b) Pepsin and HCl (c) Trypsin ahd HCl (d) Amylase and Pepsin.

54. Maximum amount of water from glomerular filtrate is reabsorbed in
    (a) Proximal Convoluted Tubule   (b) Distal Convoluted Tubule
    (c) Descending limb of Henle's loop   (d) Ascending limb of Henle's loop.

55. What will happen if diameter of artery is reduced?
    (a) Blood pressure will fall   (b) Blood pressure will increase
    (c) Blood pressure will remain same   (d) Blood will coagulate.

56. Which one of the following is the correct set of examples of a particular group?
    (a) Mushroom, Yeast, Riccia- Fungi (b) Starfish, Catfish, Dogfish- Pisces
    (c) Paramoceium, Euglia, Obellia- Protista (d) Whale, Frog, Bat- Craniata.

57. Whose functions are same of the following?
    (a) Stomata and Veins (b) Stomata and Lenticels
    (c) Lenticels and Parenchyma (d) Hydathodes and Seive Tube.

58. Find the odd man out
    (a) Gonadotrophins (b) Thyrotrophins (c) Corticotrophins (d) Vasopressin.

59. Which one of the following is a character of self-pollinated flower?
    (a) Flowers are large and showy.
    (b) Petals remain closed and do not open
    (c) Stigma and another mature at different time.
    (d) Poilens are produced in a very large quantities.

60. The chief excretory substance of vegetarian people is
    (a) Ammonia (b) Urea (c) Uric Acid (d) Lactic Acid.

HISTORY

61. Who wrote 'The Spirit of Laws'?
    (a) Adam Smith (b) Rousseau (c) Montesquieu (d) Voltaire.

62. The treaty of Tilsit (1807) was signed between
    (a) France and Russia (b) France and Prussia (c) France and England (d) France and Austria.

63. Who became the king after the July Revolution of 1830?
    (a) Louis Napolean (b) Louis Philippe (c) Louis Blanc (d) Louis XVIII.

64. Who was called 'Czar the Liberator"
    (a) Nicholas I (b) Nicholas II (c) Alexander I (d) Alexander II

65. By which treaty Clive secured the Diwani of Bengal, Bihar and Orissa?
    (a) Treaty of Allahabad (b) Treaty of Alinagar (c) Treaty of Bassein (d) Treaty of Bengal.

66. The first Peshwa of the Marathas was
    (a) Balaji Biswanath (b) Balaji Baji Rao (c) Baji Rao I (d) Madhab Rao.

67. Calcutta Medical College was founded by
    (a) David Hare (b) Lord Hardinge (c) Sir Charles Wood (d) Lord William Bentick.

68. The founder of Dawn Society was
    (a) Sachindra Prasad Basu (b) Satish Chandra Mukherjee
    (c) Aurobindo Ghosh (d) Girish Chandra Ghosh.

69. Who was knows as 'Lokahitobadi'?
    (a) Bal Gangadhar Tilak (b) Gopal Krishna Gokhale
    (c) Gopal Hari Deshmukh (d) Gopal Ganesh Agarkar.

70. The Congress declared demand for complete independence in the year
    (a) 1927 AD (b) 1907 AD (c) 1929 AD (d) 1950 AD.

71. The Zollverein of Germany was
    (a) Teachers' Union (b) Tariff Union (c) Student's Union (d) Revenue Union.

72.   Who wrote 'Mein Kampf'?
      (a) Hitler   (b) Gottfried Fieder   (c) Fredrick Ebert   (d) Hindenburg.

73.   The Capital of India was shifted from Calcutta to Delhi during the reign of
      (a) Lord Curzon   (b) Lord Minto   (c) Lord Hardinge   (d) Lord Chelmsford.

74.   Who was the Viceroy of India at the time of Jallianwala Bagh massacre?
      (a) Lord Curzon   (b) Lord Minto   (c) Lord Bentinck   (d) Lord Chelmsford.

75.   Who was elected the first chairman of the Constituent Assembly?
      (a) Dr. B. R. Ambedkar   (b) Dr. Rajendra Prasad
      (a) Mahatma Gandhi   (d) Jawaharlal Nehru.

GEOGRAPHY

76.   The Sun looks the smallest from the earth on
      (a) 3rd January   (b) 21st June   (c) 4th July   (d) 22nd December.

77.   Among the Geomorphic processes, denudation is a
      (a) Constructive process   (b) Gradational process
      (c) Destructive process   (d) Endogenous process.

78.   In the equatorial region due to high temperature and humidity
      (a) Mechanical weathering is predominant
      (b) Chemical weathering is predominant
      (c) Both mechanical and chemical weathering are predominant
      (d) Organic weathering is predominant.

79.   'Out wash plain' are formed by
      (a) Glacial abrasion   (b) Glacial deposition   (c) Glacial plucking   (d) None of the above.

80.   I stay over the equatorial region. Due to high temperature continuous ascent of air is common. No
      horizontal flow of air is found. Who am I?
      (a) Doldrums   (b) Hore latidue   (c) Geostrophic wind   (d) Coriolis force.

81.   Hurricane is one type of
      (a) Easterly wave   (b) Temperate cyclone   (c) Anti cyclone   (d) Tropical cyclone.

82.   Somali Current flows along the coast of
      (a) Africa   (b) Oceania   (c) North America   (d) Europe.

83.   The highest plateau of India is
      (a) Deccan Plateau   (b) Pat region   (c) Ladakh plateau   (d) Meghalalya plateau.

84.   Pulm, Palas, Sirish etc. are important trees of
      (a) Himalayan Mountainous forest   (b) Dry deciduous forest
      (c) Wet deciduous forest   (d) Evergreen forest.

85.   Rainbow revolution related to
      (a) New Agricultural Policy   (b) Egg Production
      (c) Artificial Rain   (d) Non-conventional energy.

86.   Alluminium is produced from
      (a) Biotite   (b) Magnetite   (c) Bauxite   (d) Anthracite.

87.   Which industry is called the 'Sunrise Industry'?
      (a) Automobile Industry   (b) Jute Industry
      (c) Cotton Textile Industry   (d) Petro-Chemical Industry.

88. The population sex ratio is lower in which state / union territory as per 2011 census
    (a) Hariyana　　　　(b) Daman　　　　(c) Kerala　　　　(d) West Bengal.

89. Vitim and Aldin are two principal tributaries of the river
    (a) Ob　　　　(b) Yenisey　　　　(c) Lena　　　　(d) Amur.

90. In west Bengal the river which makes a boundary between the two districts of Birbum and Bardhman.
    (a) Ajay　　　　(b) Damodar　　　　(c) Mayurakshi　　　　(d) Kangsabati.

POLITICAL SCIENCE

91. The words 'Socialist' and 'Secular' were added to the Preamble of the Constitution of India by the
    (a) Original Text of the Indian Constitution　　(b) 42nd Constitutional Amendment Act
    (c) 44th Constitutional Amendment Act　　(d) 93rd Constitutional Amendment Act.

92. How many members in the Rajya Sabha can be nominated by the President of India?
    (a) 2　　　　(b) 4　　　　(c) 6　　　　(d) 12.

93. The 'Social Contract' was written by
    (a) Aristotle　　　　(b) Machiavelli　　　　(c) Plato　　　　(d) Rousseau.

94. The headquarter of the International Court of Justice is
    (a) New York　　　　(b) Paris　　　　(c) Heague　　　　(d) London.

95. The declaration of 'South Asian Association for Regional Co-operation' (SAARC) was signed on
    (a) 1983, 8th December　　(b) 1985, 8th December
    (c) 1981, 8th December　　(d) 2007, 8th December.

ECONOMICS

96. Excess supply of money will not create inflationary pressure if, in the country,
    (a) demand for different good and services increase.
    (b) productivity increases.
    (c) rate of tax decreases.
    (d) rate of interest decreases.

97. Which one of the following costs has to be incurred even if production remains closed for a temporary period?
    (a) Electricity charges　　　　(b) Transportation costs
    (c) Rent for factory building　　　　(d) Expenditure on raw materials.

98. The three basic problems of an economic system arise from
    (a) inequality of income　　　　(b) market failure
    (c) failure of planning　　　　(d) scarcity of resources.

99. Which one of the following is not a source of government revenue?
    (a) Grant-in-aid　　　　(b) Public debt　　　　(c) Stamp duty　　　　(d) Income tax.

100. Which of the following institutions is the Central Bank of India?
    (a) State Bank of India　　　　(b) Indian Bank
    (c) Central Bank of India　　　　(d) Reserve Bank of India.

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