

SEAL

Test Booklet Number

Subject Code - 1201

Roll Number

00773**MATHEMATICS & SCIENCE**

[Time : 2 Hours]

[Maximum Marks : 300]

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you answer the questions given in this Test Booklet :

1. Answers to questions in this Test Booklet are to be given on an **OMR Answer Sheet** provided to the candidate **separately**.
2. Candidate must fill up Name, Category, Test Booklet Number, Subject Code and Roll Number in the Answer Sheet carefully as per instructions given.
3. This Test Booklet consists of 75 questions. All questions are compulsory and carry equal marks.
4. Each question in this Test Booklet has four possible alternative answers namely, (A), (B), (C) and (D), one of which is correct. Candidate should choose the correct answer against each question out of four alternative answers.
5. Candidate is instructed to answer the questions by **darkening (●)** with **Ball Point Pen** only in the circle bearing the correct answer.
6. Candidate should not attempt more than one answer in each question. More than one attempt in any form against a question shall be treated as incorrect.
7. Marking of answer other than darkening shall be cancelled and darkening should remain within the circle or otherwise computer shall not accept during evaluation of answer-script.
8. Rough work must not be done on the Answer Sheet. Use the blank space given in the Test Booklet for rough work.
9. Candidate is to hand over the Answer Sheet to the Invigilator before leaving the Examination Hall.
10. **NEGATIVE MARKING** : Each question carries 4 (four) marks for correct response. For each incorrect response, 1 (one) mark will be deducted from the total score. More than one answer indicated against a question will be deemed as incorrect response and will be negatively marked.

P.T.O.

SEAL**SEAL**

MATHEMATICS

1. The irrational number between 2 and 3 is

- (A) $\sqrt{2}$
- (B) $\sqrt{3}$
- (C) $\sqrt{5}$
- (D) $\sqrt{11}$

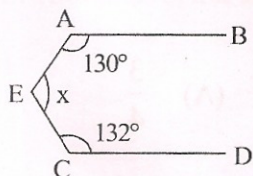
2. If $\sqrt{6} = 2.448$, then the value of $\frac{3\sqrt{2}}{2\sqrt{3}}$ is

- (A) 0.816
- (B) 1.224
- (C) 0.613
- (D) 2.449

3. The remainder, when $p(x) = x^4 + 2x^3 - 3x^2 + x - 1$ is divided by $x + 2$ is

- (A) -21
- (B) 21
- (C) 15
- (D) -15

4. In the given figure, $AB \parallel CD$, then the value of x is



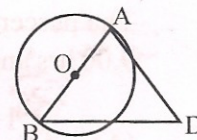
- (A) 80°
- (B) 88°
- (C) 90°
- (D) 98°

5. If ABCD is an isosceles trapezium with $AB \parallel DC$, then $\angle C$ is equal to

- (A) $\angle B$
- (B) $\angle A$
- (C) $\angle D$
- (D) 90°

6. In given figure, AB is a diameter of circle with centre O. D is a point lying outside the circle. Then $\angle ADB$ is

- (A) 90°
- (B) greater than 90°
- (C) less than 90°
- (D) None of these



7. The perimeter of a triangular field is 144 m and the ratio of its sides is 3 : 4 : 5. The area of the field is

- (A) 864 m^2
- (B) 468 m^2
- (C) 824 m^2
- (D) 1440 m^2

8. If the height of a cube is equal to the diameter of a sphere, then taking $\pi = \frac{22}{7}$, the ratio of the volume of the cube to that of the sphere is

- (A) 3 : 4
- (B) 21 : 11
- (C) 4 : 3
- (D) 11 : 21

9. The mean of first five prime numbers is

- (A) 5.6
- (B) 3.6
- (C) 6.83
- (D) 5.2

10. A car is going on a long journey for 16 hours, starting at 5.00 hrs. The speeds of the car at different hours are as under :

Time (in hr) :	5	7	9	11	13	15	17	19	21
Speed (in kmph) :	40	50	60	80	70	65	75	60	50

The percentage increase in speed during 9.00 hrs and 11.00 hrs is

- (A) $33\frac{1}{3}\%$
 (B) 35%
 (C) $23\frac{1}{3}\%$
 (D) 45%
11. If α, β are the zeroes of the polynomial $p(x) = 4x^2 + 4x - 1$, then $\frac{1}{\alpha} + \frac{1}{\beta}$ is equal to
- (A) 4
 (B) -4
 (C) $\frac{1}{4}$
 (D) $-\frac{1}{4}$
12. If the pair of linear equations $2x + 3y = 11$ and $(m - n)x + (2m - 4n)y = 22$, has infinitely many solutions, then
- (A) $m = 1, n = 5$
 (B) $m = -1, n = 5$
 (C) $m = 5, n = -1$
 (D) $m = 5, n = 1$

13. The roots of the quadratic equation $3x^2 - kx + 14 = 0$ are in the ratio 7 : 6, then the value of k is

- (A) -3
 (B) 1
 (C) 12
 (D) 13

14. The value of x for which the terms $2x, x + 10$ and $3x + 2$ are in A.P., is

- (A) 2
 (B) 4
 (C) 6
 (D) 1

15. In a $\triangle ABC$, D and E are points on sides AB and AC respectively such that BCED is a trapezium. If $DE : BC = 3 : 5$, then

- $\frac{\text{area}(\triangle ADE)}{\text{area}(\text{Trap. BCED})}$ is equal to
- (A) $\frac{3}{4}$
 (B) $\frac{9}{16}$
 (C) $\frac{3}{5}$
 (D) $\frac{9}{25}$

16. The value of k for which $(-3, 12)$, $(7, 6)$ and $(k, 9)$ are collinear, is
- (A) 3
(B) 4
(C) 2
(D) 1
17. If θ is acute and $\frac{\cos^2 \theta}{\cot^2 \theta - \cos^2 \theta} = 3$, then the value of θ is
- (A) 30°
(B) 45°
(C) 90°
(D) 60°
18. In a right triangle ABC , right angled at B , $BC = 6$ cm and $AB = 8$ cm. A circle is inscribed in $\triangle ABC$. The radius of this circle is
- (A) 1 cm
(B) 2 cm
(C) 3 cm
(D) 4 cm
19. The diameter of a copper sphere is 6 cm. It is melted and drawn into a wire of diameter 0.2 cm. The length of wire is
- (A) 36 cm
(B) 360 cm
(C) 3600 cm
(D) 360 m
20. The probability that in a family of 3 children, there will be at least one boy, is
- (A) $\frac{7}{8}$
(B) $\frac{1}{8}$
(C) $\frac{3}{8}$
(D) $\frac{6}{8}$

SCIENCE

21. The angular velocity of the minutes hand of a clock is
- (A) $\frac{\pi}{180}$ rad/s
- (B) $\frac{\pi}{1800}$ rad/s
- (C) $\frac{\pi}{60}$ rad/s
- (D) $\frac{\pi}{360}$ rad/s
22. Action - reaction forces
- (A) act on the same body
- (B) act on different bodies
- (C) act along different lines
- (D) act in the same direction
23. A force of 16 N is distributed uniformly on one surface of a cube of edge 8 cm. The pressure on this surface is
- (A) 3500 Pa
- (B) 2500 Pa
- (C) 4500 Pa
- (D) 5500 Pa
24. The weight of a body is measured to be 120 N on the earth. If it is taken to the moon, its weight will be about
- (A) 120 N
- (B) 60 N
- (C) 20 N
- (D) 720 N
25. A body at rest can have
- (A) speed
- (B) velocity
- (C) momentum
- (D) energy
26. Longitudinal waves cannot travel through
- (A) vacuum
- (B) solids
- (C) liquids
- (D) gases

27. The time period of a simple pendulum is 1.2 second. If the length of the pendulum is doubled, the new time period will be
- (A) 1.1 s
(B) 1.3 s
(C) 1.5 s
(D) 1.7 s
28. The focal length of a concave mirror is f and the distance of the object to the principal focus is p . Then the ratio of the size of the image to the size of the object is
- (A) $\frac{f}{p}$
(B) $\frac{p}{f}$
(C) fp
(D) \sqrt{fp}
29. The property of an optical instrument, by virtue of which it can form separate images of two close objects, is
- (A) magnifying power
(B) dispersive power
(C) resolving power
(D) illumination
30. One cannot see through fog because
- (A) fog absorbs light
(B) refractive index of fog is unity
(C) light suffers total internal reflection at the droplets in fog
(D) light is scattered by the droplets in fog
31. A ray of light incident normally on one face of prism just suffers total internal reflection at the other face. The refracting angle of the prism is
- (A) 30°
(B) 45°
(C) 60°
(D) 75°
32. Electric lines of force about a negative charge are
- (A) circular and anti-clockwise
(B) circular and clockwise
(C) radial and inward
(D) radial and outward

33. How much electrical energy in kilowatt hours is consumed in operating ten 50-watt bulbs for ten hours per day in a month of 30 days?
- (A) 1500
(B) 15000
(C) 15
(D) 150
34. An electrician has only two resistances. By joining them in series or in parallel combinations, 3, 4, 12 and 16 Ω resistances can be obtained. The two resistances are
- (A) 4 Ω and 16 Ω
(B) 4 Ω and 12 Ω
(C) 7 Ω and 9 Ω
(D) 6 Ω and 10 Ω
35. A compass needle just above a wire in which electrons are moving towards east, will point
- (A) east
(B) west
(C) north
(D) south
36. At grid substation, the voltage is stepped up to reduce loss of
- (A) current
(B) electrical energy
(C) power
(D) resistance
37. When steam is passed over hot coke, it produces
- (A) producer gas
(B) water gas
(C) laughing gas
(D) coal gas
38. Choose the source of energy which is different from others
- (A) Natural gas
(B) Petroleum
(C) Uranium
(D) Wood

39. Which of the following is the biggest planet?
- (A) Jupiter
(B) Venus
(C) Mercury
(D) Pluto
40. The outermost layer of the earth is called
- (A) Crust
(B) Mantle
(C) Core
(D) Organic complex
41. Which one of the following was the correct condition for carrying out the gas discharge tube experiment for the discovery of electrons?
- (A) High pressure, high voltage
(B) Low pressure, low voltage
(C) Low pressure, high voltage
(D) High pressure, high temperature
42. Identify the pair which is not isoelectronic from the following options
- (A) Mg^{2+} , F^-
(B) O^{2-} , N^{3-}
(C) Na , Mg^{2+}
(D) Li^+ , Be^{2+}
43. The element of atomic number 12 is closest in chemical properties of the element having atomic number
- (A) 11
(B) 13
(C) 20
(D) 18
44. Oxidation of ammonia takes place in the following manner :
- $$4NH_3(g) + 5O_2(g) \rightarrow 6H_2O(g) + 4NO(g)$$
- The mass of water that can be produced from 34 g of ammonia after oxidation will be (molecular mass of ammonia = 17)
- (A) 9.0 g
(B) 18.0 g
(C) 36.0 g
(D) 54.0 g

45. What name is given to the reaction between hydrogen ion (H^+) and hydroxyl ion (OH^-) ?
- (A) Hydrolysis
(B) Neutralization
(C) Ionization
(D) Hydrogenation
46. Which one of the following reactions involves oxidation and reduction ?
- (A) $Na_2SO_4(aq) + BaCl_2(aq) \rightarrow NaCl(aq) + BaSO_4(s)$
(B) $Zn(s) + H_2SO_4(aq) \rightarrow ZnSO_4(aq) + H_2(g)$
(C) $NaCl(aq) + AgNO_3(aq) \rightarrow AgCl(s) + NaNO_3(aq)$
(D) $Al(NO_3)_3(aq) + 3NH_4OH(aq) \rightarrow Al(OH)_3(s) + 3NH_4NO_3(aq)$
47. An element A with atomic number 11 combines with another element B having atomic number 17 to form a solid C. The solid C
- (A) has high melting point and high boiling point
(B) has low melting point and low boiling point
(C) is good conductor of electricity
(D) is insoluble in water
48. Which one of the following salts will form basic solution on dissolving in water ?
- (A) Na_2CO_3
(B) Na_2SO_4
(C) $NaCl$
(D) KCl
49. Which one of the following metals cannot be obtained by reduction using carbon ?
- (A) Fe
(B) Zn
(C) Cu
(D) Mg

50. The reducing agent used in thermite process is
- (A) carbon
 - (B) hydrogen
 - (C) carbon monoxide
 - (D) aluminium powder
51. Plaster of Paris is represented as
- (A) $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
 - (B) $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
 - (C) $\text{CaCO}_3 \cdot \text{CaSO}_4$
 - (D) $\text{CaSO}_4 \cdot 3\text{H}_2\text{O}$
52. Froth floatation technique is generally used to concentrate
- (A) oxide ores
 - (B) sulphide ores
 - (C) carbonate ores
 - (D) halide ores
53. Ammonia is synthesised as following
- $$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \xrightarrow{\text{catalyst}} 2\text{NH}_3(\text{g})$$
- For preparing 4 mol of ammonia, the mass of hydrogen required will be
- (A) 6 g
 - (B) 9 g
 - (C) 12 g
 - (D) 15 g
54. Chemical formula of baking soda is
- (A) $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$
 - (B) NaHCO_3
 - (C) $\text{Na}_2\text{CO}_3 \cdot \text{CaCO}_3$
 - (D) Na_2CO_3
55. Number of structural isomers of C_4H_{10} is
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4

56. In an experiment, 1 ml of ethyl alcohol and 1 ml of acetic acid are taken in a test tube and 1 drop of concentrated sulphuric acid is added, ethylacetate is obtained. The process is known as
- (A) Hydrolysis
 - (B) Esterification
 - (C) Saponification
 - (D) Neutralization
57. When vapours of ethyl alcohol are passed over heated alumina (Al_2O_3) above 350°C , the compound which is obtained is
- (A) acetaldehyde
 - (B) ethene
 - (C) formaldehyde
 - (D) ethane
58. Structural formula for propyne is
- (A) $\text{CH}_2 = \text{C} = \text{CH}_2$
 - (B) $\text{CH} = \text{CH} = \text{CH}_2$
 - (C) $\text{CH}_3 - \text{C} \equiv \text{CH}$
 - (D) $\text{CH}_3 \equiv \text{C} - \text{CH}$
59. Which one of the following is a natural fibre?
- (A) Cellulose
 - (B) Polythene
 - (C) Nylon
 - (D) Terylene
60. In natural gas, main constituent is
- (A) butane
 - (B) iso-butane
 - (C) propene
 - (D) methane
61. Which of the following is bio-degradable?
- (A) DDT
 - (B) Cotton
 - (C) Mercury
 - (D) Plastic

62. Which of the following synthesizes carbohydrates from inorganic raw materials ?

- (A) Herbivores
- (B) Carnivores
- (C) Decomposers
- (D) Producers

63. Which groups of animals have a covering of scales over the body ?

- (i) Mammals (ii) Reptiles
 - (iii) Amphibia (iv) Pisces
- (A) (i) and (ii)
 - (B) (ii) and (iii)
 - (C) (ii) and (iv)
 - (D) (i) and (iv)

64. Which of the following cell organelles have their own DNA and ribosomes ?

- (i) Plastids
 - (ii) Golgi apparatus
 - (iii) Mitochondria
 - (iv) Endoplasmic reticulum
- (A) (i) and (ii)
 - (B) (i) and (iii)
 - (C) (ii) and (iii)
 - (D) (ii) and (iv)

65. The various aspects of scientific management of animal livestock, which include feeding, breeding, housing and disease control are termed as

- (A) Cattle farming
- (B) Livestock farming
- (C) Animal husbandry
- (D) Animal-based farming

66. Which variety of honeybee is commonly used for commercial honey production ?
- (A) *Apis florae*
 - (B) *Apis dorsata*
 - (C) *Apis mellifera*
 - (D) *Apis cerana*
67. The correct definition of vector is
- (A) infected person suffering from a communicable disease
 - (B) microorganism which causes a disease in humans
 - (C) an animal which transmits microbes from one person to another
 - (D) materials which cause allergies in humans
68. The human males after attaining puberty start producing sperm in
- (A) epididymis
 - (B) testes
 - (C) prostate gland
 - (D) scrotal sac
69. The structural and functional unit of kidney is
- (A) nephron
 - (B) neuron
 - (C) Bowman's capsule
 - (D) ureter
70. The breathing rate in aquatic organisms is more than terrestrial organisms because
- (A) the aquatic organisms require more oxygen to carry out their life process than terrestrial organism
 - (B) lesser amount of oxygen remains dissolved in water than that present in air
 - (C) the respiratory organs of aquatic organisms do not efficiently work
 - (D) All of the above
71. Which component of food gets affected in the mouth cavity by the action of salivary amylase ?
- (A) Fats are broken down into fatty acids and glycerol
 - (B) Starch is broken down into sugars
 - (C) Proteins are broken down into amino acids
 - (D) Vitamins and minerals get absorbed

72. Hormone that promotes growth in plants is

- (A) T-RH
- (B) TSH
- (C) abscisic acid
- (D) auxin

73. The system of naming organisms by scientific names was introduced by

- (A) Charles Darwin
- (B) Whittaker
- (C) Carolus Linneus
- (D) Robert Hooke

74. A zygote which inherited 'X' chromosome from father will develop into a

- (A) girl
- (B) boy
- (C) X-chromosome does not determine the sex of a child
- (D) either boy or girl

75. Oxygen is continuously being used by living organisms but its percentage in the atmosphere remains nearly the same. Which of the following processes is responsible for the return of oxygen to the atmosphere ?

- (A) Respiration
- (B) Fermentation
- (C) Photosynthesis
- (D) Burning of fossil fuels