

Test Booklet Number

Test - 0801

Roll Number

0084

MATHEMATICS & SCIENCE

[Time : 1 Hour]

[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 a computerised **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 instruction 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 HB pencil only) to the circle bearing the correct answer.
6. After attempting a question, if candidate wants to change his/her answer, erase completely to change the response and re-dark another circle.
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 this purpose.
9. Candidate is to hand over both the Test Booklet and 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.

SET - I (MATHEMATICS)

1. Taxi charges in a city comprise of a fixed charge for the first kilometer followed by charge per km for distance travelled. For journeys of 11 km and 26 km, the money paid are Rs. 93 and Rs. 213 respectively. The charge for a journey of 21 km is :

- a) Rs. 471
- b) Rs. 168
- c) Rs. 173
- d) Rs. 137

2. A shopkeeper buys a number of books for Rs. 80. If he had bought 4 more books for the same amount, each book would have cost him Re 1 less. The number of books bought are :

- a) 15
- b) 16
- c) 20
- d) 10

3. On simplification,

$$\frac{1+x}{1-x} - \frac{1-x}{1+x} + \frac{4x}{1+x^2} + \frac{8x^3}{1-x^4} \text{ reduces to :}$$

- a) $\frac{4x}{1+x^2}$
- b) $\frac{4x}{1-x^2}$
- c) $\frac{8x}{1-x^2}$
- d) $\frac{8x}{1+x^2}$

4. $(x-b)$ is G.C.D of x^2-x-12 and x^2-2x-8 .

The value of b is :

- a) 4
- b) -3
- c) -2
- d) -4

5. If for an arithmetic progression, sum of first n terms S_n is $S_n = 3n^2 + 5n$, the increase of 10th term over 6th term is :

- a) 12
- b) 16
- c) 24
- d) 36

6. The cost of a washing machine is Rs. 9000. A man agrees to pay Rs. 2200 in cash followed by five equal monthly instalments of Rs. 1400 each. The rate of interest under instalment scheme is :

- a) 8%
- b) 10%
- c) 12%
- d) 15%

7. Mohan bought 20 dining tables for Rs. 12000 and sold them at a profit equal to S.P of 4 dining tables. Selling price of 1 table is :

- a) Rs. 800
- b) Rs. 750
- c) Rs. 850
- d) Rs. 650

8. The value of $(1 + \cot\theta - \operatorname{cosec}\theta)(1 + \tan\theta + \sec\theta)$ is :

- a) 2
- b) 1
- c) 0
- d) -1

9. On simplification $\frac{2 \cos^2\theta - 1}{\sin\theta \cos\theta}$ equals :

- a) $\tan\theta - \cot\theta$
- b) $\cot\theta - \tan\theta$
- c) $\cot\theta + \tan\theta$
- d) $\cos\theta - \sin\theta$

10. The angles of elevation of the top of a tower as observed by two men on the opposite sides of the tower are 60° and 30° . If the height of the tower is $20\sqrt{3}$ m, the distance between them is :

- a) 60 m
- b) 70 m
- c) 80 m
- d) 90 m

11. The mean of the following frequency distribution.

Classes :	0-20	20-40	40-60	60-80	80-100
Frequency :	2	5	10	p	2

is 50. The value of p is :

- a) 5
- b) 15
- c) 10
- d) 20

12. Out of a pack of 52 playing cards, 2 red Kings and 2 black Jacks fell down. Out of the remaining well shuffled pack, a card was drawn at random. The probability that the selected card is not a Jack is :

- a) $\frac{1}{26}$
- b) $\frac{1}{24}$
- c) $\frac{25}{26}$
- d) $\frac{23}{24}$

13. The monthly expenditure of a household on various heads in given below :

Head :	Rent	Food	Clothing	Travelling	Others
Expenditure in rupees :	5000	15000	5000	4000	7000

The central angle for "Food" in the pie chart for the above data is :

- a) 50°
- b) 40°
- c) 150°
- d) 70°

14. The coordinates of the centroid of a triangle ABC are (6,1), The two vertices A and B are the points (3,2) and (11,4). The third vertex C is :

- a) (-4, -3)
- b) (4, 3)
- c) (4, -3)
- d) (-4, 3)

15. ABCD is a trapezium in which $AB = 7$ cm, $AD = BC = 5$ cm, $AB \parallel CD$. The distance between AB and $CD = 4$ cm.

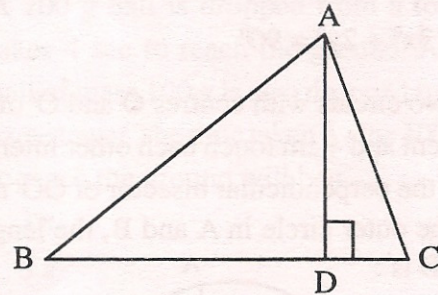
Area of the trapezium is :

- a) 26 cm^2
 b) 52 cm^2
 c) 40 cm^2
 d) 80 cm^2
16. The height of a cone is double the base radius. The ratio of the volume of the cone to that of a hemisphere of same radius as that of cone is :
- a) 1 : 1
 b) 2 : 1
 c) 1 : 2
 d) 1 : 3
17. The base of a right pyramid is an equilateral triangle with side 6 cm. The volume of the pyramid is 3653 cm^3 . The height of the pyramid is :
- a) 10 cm
 b) 12 cm
 c) 14 cm
 d) 8 cm

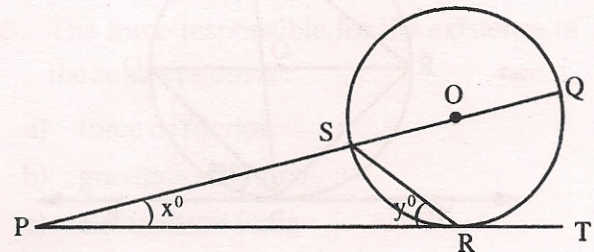
18. If $9^x - 3 \cdot 9^{x-1} = 54$, the value of x is :

- a) 0
 b) 1
 c) 2
 d) 3

19. AD is perpendicular to the base BC of ΔABC such that $BD = 3 CD$. Which one of the following statements is correct?

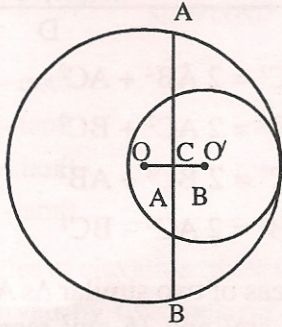


- a) $2 BC^2 = 2 AB^2 + AC^2$
 b) $2 AB^2 = 2 AC^2 + BC^2$
 c) $2 AC^2 = 2 BC^2 + AB^2$
 d) $2 AB^2 = 2 AC^2 - BC^2$
20. The areas of two similar Δ s ABC and DEF are 36 cm^2 and 16 cm^2 respectively. The lengths of the sides DE, EF and DF are 5 cm, 8 cm and 6 cm respectively. The length of side BC is :
- a) 7.5 cm
 b) 9.0 cm
 c) 8.0 cm
 d) 12.0 cm
21. In figure, the line segment PT is tangent to the circle whose centre is O, Diameter SQ is produced to intersect PT at P. If $\angle SPR = x^\circ$ and $\angle SRP = y^\circ$, then



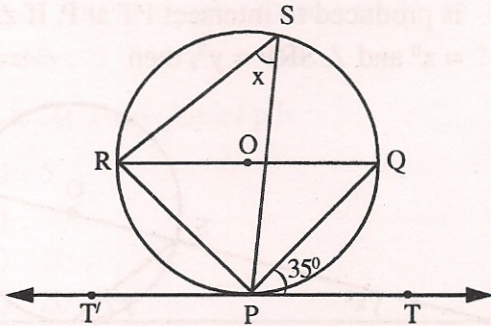
- a) $2x^0 + y^0 = 90^0$
- b) $x^0 + 2y^0 = 90^0$
- c) $2x^0 + 3y^0 = 90^0$
- d) $3x^0 + 2y^0 = 90^0$

22. Two circles with centres O and O' of radii 6 cm and 4 cm touch each other internally. If the perpendicular bisector of OO' meets the outer circle in A and B, the length of AB is :



- a) $\sqrt{35}$ cm
- b) $\frac{1}{2}\sqrt{35}$ cm
- c) $2\sqrt{35}$ cm
- d) $3\sqrt{35}$ cm

23. T'PT is a tangent to the circle whose centre is O. If $\angle QPT = 35^0$, the measure of $\angle x$ is :



- a) 15^0
- b) 20^0
- c) 35^0
- d) 55^0

24. The value of

$$\left(\frac{1}{1+x}\right)\left(\frac{1}{1+x^2}\right)\left(\frac{1}{1+x^4}\right)\left(\frac{1}{1-x}\right) \text{ equals}$$

to :

- a) $\left(\frac{1}{1+x^2}\right)$
- b) $\left(\frac{1}{1+x^4}\right)$
- c) $\left(\frac{1}{1-x^6}\right)$
- d) $\left(\frac{1}{1-x^8}\right)$

25. The solution of the following equations gives $x + y$ equals :

$$\frac{35}{x+y} + \frac{77}{x-y} = 82$$

$$\frac{77}{x+y} + \frac{35}{x-y} = 46$$

- a) 1
- b) 6
- c) 7
- d) 12

B - Science (PHYSICS)

26. A boy floats in water with one fourth of its volume above the surface of water. The relative density of the body is :

- a) $\frac{1}{4}$
- b) $\frac{3}{4}$
- c) $\frac{4}{3}$
- d) $\frac{4}{1}$

27. The time period of a simple pendulum doubles when :

- a) its length is doubled
- b) the mass of the bob is doubled
- c) its length is increased to four times
- d) the mass of the bob and length of pendulum both are doubled.

28. Which one of the following is carried by the waves from one place to another?

- a) Mass
- b) Energy
- c) Velocity
- d) Wavelength

29. Which one of the following is a geostationary satellite?

- a) IRS
- b) Aryabhata

- c) INSAT
- d) APPLE

30. A 200 g ball is dropped from a tower. It takes 4 sec to reach the ground. Another ball of mass 100 g is also dropped from the same tower. The time taken by the 100 g ball to reach the ground will be :

- a) 3 s
- b) 5 s
- c) 4 s
- d) 2 s

31. During melting, the temperature of ice does not increase. Which of the following statements explains this phenomenon?

- a) Only kinetic energy of vibration increases.
- b) Only intermolecular potential energy increases.
- c) No increase in internal energy takes place.
- d) Increase in kinetic energy get balanced by decrease in potential energy.

32. Which one in the following is not ultimately derived from Sun's energy?

- a) Geothermal energy
- b) Wind energy
- c) Fossil fuel
- d) Biomass

33. The force responsible for the existence of the solar system is :

- a) force of friction
- b) gravitational force
- c) electrostatic force
- d) magnetic force

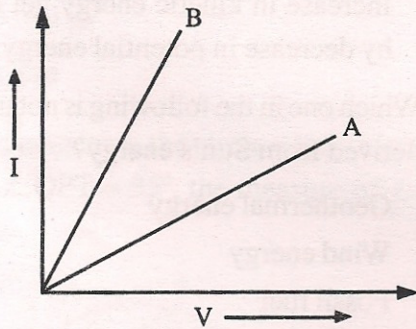
34. The resistance of the filament of a 250 V, 100 watt lamp when glowing is :

- a) $\frac{4}{25} \Omega$
- b) 2.5Ω
- c) 25Ω
- d) 6225Ω

35. A magnet is broken into three equal pieces. The strength of the new pole :

- a) remains the same
- b) becomes one-half of the original value
- c) becomes double of the original value
- d) one third of the original value

36. V-I graph for parallel and series combination of two metallic resistances are shown in the figure. Which of the two represents the parallel combination?

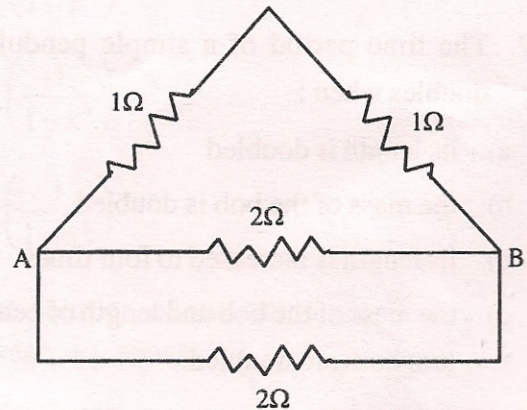


- a) A
- b) B
- c) A or B depending on the values of two resistances.
- d) Can not be predicted

37. A piece of wire is redrawn by pulling it until its length is doubled. If R is the resistance of the original wire, the new wire will have the resistance :

- a) $2R$
- b) $4R$
- c) $\frac{R}{2}$
- d) $\frac{R}{4}$

38. The resistance between A and B in the given network is :



- a) 2Ω
- b) $\frac{1}{2} \Omega$
- c) $\frac{3}{2} \Omega$
- d) $\frac{2}{3} \Omega$

39. An object is placed at a distance of 10 cm in front of a concave mirror of radius of curvature 15 cm. The image formed has a magnification of :

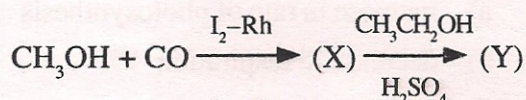
- a) 1.5
b) -3.0
c) 4.5
d) -4.5
40. A small electric lamp placed at the focal point of a convex lens produces :
- a) converging beam of light
b) parallel beam of light
c) diverging beam of light
d) diffused beam of light
41. A convex lens of 20 cm focal length is in contact with a concave lens of 40 cm focal length. The power of the combination will be :
- a) 7.5 D
b) 6 D
c) 3 D
d) 2.5 D
42. A ray of light is incident on a plane mirror making an angle of 30° with the mirror. The angle which the reflected ray makes with the incident ray is :
- a) 30°
b) 60°
c) 90°
d) 120°
43. The most reactive non-metal in period 2 of the Periodic Table is :
- a) carbon
b) oxygen
c) nitrogen
d) fluorine
44. A compound is 86% carbon and 14% hydrogen by mass. The empirical formula for this compound is : (Atomic mass : C = 12.0, H = 1.0)
- a) CH
b) CH₂
c) CH₃
d) CH₄
45. The relative atomic masses of many elements are not whole numbers because :
- a) all elements are not gases
b) elements are mixtures of isobars
c) elements are mixtures of isotopes
d) elements have fractional atomic masses
46. 10 g of hydrogen gas and 64 g of oxygen gas were filled in a steel vessel. The mixture was exploded with an electric spark. Number of moles of water produced in the reaction will be : [Atomic mass : H = 1.0, O = 16.0]
- a) 1 mol
b) 2 mol
c) 3 mol
d) 4 mol
47. The following set of elements which does not belong to the same group is :
- a) F, Cl, Br
b) Na, K, Rb
c) P, S, Cl
d) C, Si, Ge

48. When equilibrium is attained during a reaction ?
- The forward reaction proceeds faster
 - Both forward and backward reactions proceed at the same rate
 - The backward reaction proceeds faster
 - The reaction stops
49. The element with configuration, 2, 8, 2 would be :
- a metal
 - a non-metal
 - an inert gas
 - a metalloid
50. An example of an amphoteric oxide is :
- SiO_2
 - FeO
 - CO
 - ZnO
51. Plaster of Paris is represented as :
- $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$
 - $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$
 - $\text{CaCO}_3 \cdot \text{CaSO}_4$
 - $\text{CaSO}_4 \cdot 3\text{H}_2\text{O}$
52. In the reaction
- $$3\text{MnO}_2 + 4\text{Al} \rightarrow 3\text{Mn} + 2\text{Al}_2\text{O}_3$$
- the oxidising agent is :
- MnO_2
 - Al
 - Al_2O_3
 - Mn
53. Aluminium is not present in :
- cryolite
 - mica
 - fluorspar
 - bauxite
54. Silver bromide is used in the manufacture of :
- safety glass
 - coloured glass
 - photochromatic glass
 - pyrex glass
55. Bromine water is decolourised by :
- ethane
 - propane
 - ethene
 - methane
56. The gas produced when CaC_2 reacts with water is :
- ethylene
 - ethyne
 - methane
 - carbon monoxide
57. Vegetable oil is converted into Vanaspati Ghee by the process of :
- esterification
 - hydrogenation
 - halogenation
 - oxidation

58. The term used for hydrolysis of an ester in the presence of an alkali is :

- a) saponification
- b) hydration
- c) esterification
- d) fermentation

59. The compounds (X) and (Y) in the given series of chemical reactions are :



- a) CH_3CHO , $\text{CH}_3\text{CH}_2\text{OCH}_3$
- b) CH_3COOH , $\text{CH}_3\text{COOCH}_2\text{CH}_3$
- c) HCHO , $\text{CH}_3\text{COOCH}_3$
- d) HCHO , CH_3COCH_3

60. Hydra, earthworm, grasshopper and human are classified in the same :

- a) genus
- b) species
- c) phylum
- d) kingdom

61. A drastic change in the metabolic rate of a human would most likely result from the :

- a) oversecretion of the salivary glands
- b) overproduction of auxins
- c) deterioration of the skeletal system
- d) malfunction of the endocrine glands

62. One function of the human endoskeleton is to :

- a) transmit impulses
- b) produce blood cells
- c) produce lactic acid
- d) store nitrogenous wastes

63. In humans, carbon dioxide that is excreted passes from the blood directly into the :

- a) liver
- b) alveoli
- c) trachea
- d) kidneys

64. Which of the following of a cell is responsible for transmission of characters from parents to offsprings?

- a) Mitochondria
- b) Ribosomes
- c) Chromosomes
- d) Golgibodies

65. Which structure is usually present only in animal cells?

- a) Vacuole
- b) Cell wall
- c) Nucleus
- d) Centriole

66. In the process of photosynthesis, chlorophyll serves as :

- a) an end-product
- b) a raw material
- c) an energy converter
- d) a hydrogen acceptor

67. Binomial nomenclature of scientific naming plants and animals was proposed by :

- a) E. H. Haeckel
- b) Robert Whittaker
- c) Carolus Linnaeus
- d) Charles Darwin

68. The major constituents of acid rain are :
- hydrochloric acid and sulphuric acid
 - hydrochloric acid and nitric acid
 - nitric acid and sulphuric acid
 - acetic acid and sulphuric acid
69. The part of chloroplast where the dark reaction of photosynthesis takes place is :
- grana
 - stroma
 - thylakoids
 - stroma lamellae
70. The formation of fibrin, a component of **blood clot** is catalyzed by :
- thromboplastin
 - prothrombin
 - thrombin
 - fibrogen
71. The full form of IUCD of a contraceptive is :
- interurethra contraceptive device
 - intrauterine contraceptive device
 - interuterine contraceptive device
 - intraurethra contraceptive device
72. Insulin is secreted by :
- thyroid
 - parathyroid
 - pituitary
 - pancreas
73. Which of the following is a matching set ?
- Bat, pigeon, crow
 - Starfish, jelly fish, silver fish
 - Cattle fish, brittle star, sea feather
 - Man, monkey, whale
74. Absorption of water by the root is increased due to :
- increase in rate of photosynthesis
 - decrease in respiration
 - decrease in salt uptake
 - increase in transpiration
75. The reflex arc is formed by :
- brain → spinal cord → muscles
 - receptor → spinal cord → muscles
 - muscles → receptor → brain
 - muscles → spinal cord → receptor