

**SEAL**

Test Booklet Number

Test - 1101

Roll Number

**00965**

[Time : 2 Hours]

**MATHEMATICS & SCIENCE**

[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 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**



# SET - I (MATHEMATICS)

1. How many prime numbers are there represented by  $10n + 1$  where  $n$  is a natural number such that  $1 < n < 10$  ?  
 (A) 2  
 (B) 3  
 (C) 4  
 (D) 5
2. The polynomials  $ax^3 + 3x^2 - 3$  and  $2x^3 - 5x + a$ , when divided by  $(x - 4)$  leave the same remainder in each case, then the value of  $a$  is  
 (A) 0  
 (B) -1  
 (C) 1  
 (D) 2
3. The factors of  $(2x - 3y)^3 + (3y - 4z)^3 + 8(2z - x)^3$  are  
 (A)  $2(2x - 3y)(3y - 4z)(2z - x)$   
 (B)  $3(2x - 3y)(3y - 4z)(2z - x)$   
 (C)  $6(2x - 3y)(3y - 4z)(2z - x)$   
 (D)  $2x \times 3y \times 4z$
4. The value of  $x$  which satisfies  $\frac{7}{x+1} - \frac{12}{x} = \frac{5}{1-x}$ ,  $x \neq 0, 1, -1$  is  
 (A) 2  
 (B) 3  
 (C) 6  
 (D) -6
5. Two numbers are in the ratio 4 : 9, when 5 is subtracted from the larger number, the ratio becomes 1 : 2. The numbers are  
 (A) (10, 25)  
 (B) (20, 45)  
 (C) (24, 54)  
 (D) (25, 55)
6. Two vertices of a triangle are  $(-1, 4)$  and  $(5, 2)$  and its medians intersect at  $(0, -3)$ . The third vertex of the triangle is  
 (A) (4, 15)  
 (B)  $(-4, 15)$   
 (C)  $(-4, -15)$   
 (D)  $(4, -15)$
7. The equation  $\sqrt{x+4} - \sqrt{x+3} + 1 = 0$  has  
 (A) no root  
 (B) one rational root  
 (C) one irrational root  
 (D) two roots
8. If one of the roots of  $x^2 + ax + 4 = 0$  is twice the other root, then the value of 'a' is  
 (A)  $-3\sqrt{2}$   
 (B)  $8\sqrt{2}$   
 (C)  $\sqrt{2}$   
 (D)  $-2\sqrt{2}$
9. The perimeter of a rectangular plot is 34 m and the length of one of its diagonals is 13 m. The dimensions of the plot are  
 (A) 9 m, 8 m  
 (B) 15 m, 2 m  
 (C) 12 m, 5 m  
 (D) 10 m, 7 m
10. The number of two-digit numbers which are divisible by 3 is  
 (A) 29  
 (B) 30  
 (C) 31  
 (D) 32



11. The sum of the series

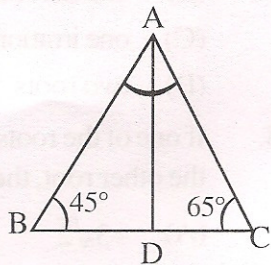
$$45^2 - 43^2 + 44^2 - 42^2 + 43^2 - 41^2 + \dots$$

up to 30 terms is

- (A) 2000  
(B) 1590  
(C) 2143  
(D) 2220

12. In  $\triangle ABC$ ,  $\angle B = 45^\circ$ ,  $\angle C = 65^\circ$  and the bisector of  $\angle BAC$  meets  $BC$  at  $D$ . Then the sides in ascending order of their length is

- (A)  $AD, BD, CD$   
(B)  $AD, CD, BD$   
(C)  $BD, AD, CD$   
(D)  $CD, BD, AD$



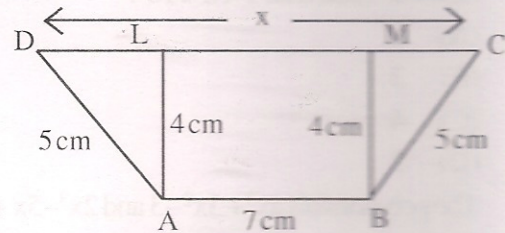
13. The largest angle of a triangle is equal to the sum of the other two. The largest angle of the triangle is

- (A)  $60^\circ$   
(B)  $70^\circ$   
(C)  $75^\circ$   
(D)  $90^\circ$

14.  $\triangle ABC \sim \triangle DEF$ ,  $AB : DE = 2 : 3$  and perimeter of  $\triangle ABC$  is 4 cm. Then the perimeter of  $\triangle DEF$  is

- (A) 16 cm  
(B) 8 cm  
(C) 6 cm  
(D) 5 cm

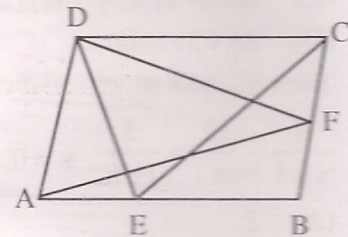
15. In given figure,  $ABCD$  is a trapezium with  $AB \parallel DC$ . If  $AB = 7$  cm,  $AD = BC = 5$  cm,  $DC = x$  cm and the distance between  $AB$  and  $DC$  is 4 cm, then the value of  $x$  is



- (A) 13 cm  
(B) 16 cm  
(C) 19 cm  
(D) cannot be determined

16. In the adjoining figure,  $ABCD$  is a parallelogram in which  $E$  is a point on  $AB$  and  $F$  is a point on  $BC$ . If area ( $\triangle ADF$ ) =  $x$  sq. units, then area ( $\triangle DCE$ ) (in square units) equals

- (A)  $2x$   
(B)  $x$   
(C)  $\frac{x}{2}$   
(D)  $\frac{x}{4}$



17. The length of a chord of a circle is equal to the radius of the circle. The angle which this chord subtends in the major segment of the circle is equal to

- (A)  $30^\circ$   
(B)  $45^\circ$   
(C)  $60^\circ$   
(D)  $90^\circ$



18. ABC is a right triangle in which  $\angle B = 90^\circ$ . A circle is inscribed in the triangle. If AB = 8 cm and BC = 6 cm, then the radius of the circle is

(A) 4 cm  
(B) 3 cm  
(C) 2 cm  
(D) 1 cm

19. The perimeter of a rhombus is 146 cm. One of its diagonals is 55 cm, then the area of rhombus is

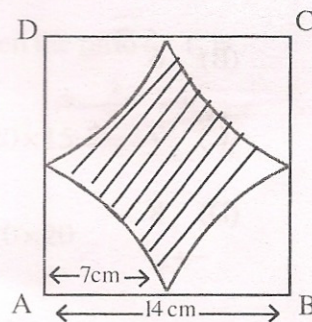
(A) 1320 sq cm  
(B) 660 sq cm  
(C) 1332.25 sq cm  
(D) 2640 sq cm

20. A cone of radius 10 cm is divided into two parts by drawing a plane through the mid-point of its axis, parallel to the base. The ratio of volumes of the two parts formed is

(A) 1 : 7  
(B) 2 : 7  
(C) 3 : 7  
(D) 4 : 7

21. From a square sheet of paper of side 14 cm, four regions each in the form of quarter of a circle of radius 7 cm are removed as shown in the adjoining figure. The area of the remaining shaded region, when  $\pi = \frac{22}{7}$ , is

(A) 196 cm<sup>2</sup>  
(B) 154 cm<sup>2</sup>  
(C) 42 cm<sup>2</sup>  
(D) 36 cm<sup>2</sup>



22. If  $\sin \theta = \frac{x}{a}$ ,  $\tan \theta = \frac{y}{b}$ , then

(A)  $\frac{a^2}{x^2} + \frac{b^2}{y^2} = 1$   
(B)  $\frac{x^2}{y^2} + \frac{a^2}{b^2} = 1$   
(C)  $\frac{a^2}{x^2} - \frac{b^2}{y^2} = 1$   
(D)  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

23. The angles of elevation of the top of a tower from the points distances a and b units from the base and on the same straight line with it are complimentary. The height of the tower is

(A)  $a\sqrt{b}$  units  
(B)  $\sqrt{ab}$  units  
(C)  $\sqrt{a} b$  units  
(D) ab units



24. The mean of the following distribution

Classes	0-10	10-20	20-30	30-40	40-50
Frequency	5	6	p	12	9

is 28.5. The value of p is

(A) 5

(B) 6

(C) 7

(D) 8

25. A box contains cards bearing numbers 5 to 35. A card is drawn from the box. The probability that the number on the card is not divisible by 5 is

(A)  $\frac{7}{30}$

(B)  $\frac{7}{31}$

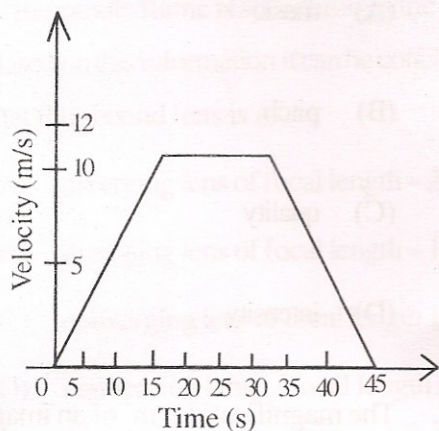
(C)  $\frac{24}{31}$

(D)  $\frac{1}{6}$



### SET - II (SCIENCE)

26. The velocity-time graph of a car moving on a horizontal road is shown in the diagram. The total distance covered by the car in its entire journey is



- (A) 270 m                      (B) 330 m  
(C) 390 m                      (D) 540 m
27. On applying a retarding force a car moving initially with a velocity  $v$  comes to rest after a time  $t$ . Select correct relationship for the motion of the car.
- (A) Distance covered by the car  $= \frac{1}{2} vt$   
(B) Distance covered by the car  $= vt$   
(C) Average velocity of the car  $= v/t$   
(D) Retardation produced in the car  $= v/2t$

28. Two steel balls of mass 8g and 20g are projected horizontally with velocities  $10\text{ms}^{-1}$  and  $15\text{ms}^{-1}$  respectively from the top of a 70 m high tower. If the respective time taken by the balls to reach the ground are  $t_1$  and  $t_2$ , then the ratio  $t_1 : t_2$  is

- (A)  $8 \times 10 : 20 \times 15$   
(B)  $8 \times 15 : 10 \times 20$   
(C)  $8 \times 10^2 : 20 \times 15^2$   
(D) 1 : 1

29. The average density of a planet is same as that of the earth but its diameter is three times the diameter of the earth. If the acceleration due to gravity on the surface of the earth is  $10\text{ms}^{-2}$  the gravitational acceleration on the surface of the planet is

- (A)  $10/9 \text{ms}^{-2}$   
(B)  $10/3 \text{ms}^{-2}$   
(C)  $10 \text{ms}^{-2}$   
(D)  $3 \times 10 \text{ms}^{-2}$



30. A metal block of weight  $0.9\text{ N}$  is suspended by a spring balance. An overflow can fully filled with water is placed on a weighing machine which reads  $1.2\text{ N}$ . The spring balance is now lowered so that the block gets completely immersed in water filled in the overflow can. The spring balance now reads  $0.82\text{ N}$ . The reading of the weighing machine and the weight of the water overflow respectively will be
- (A)  $1.12\text{ N}$  ;  $0.08\text{ N}$
  - (B)  $1.20\text{ N}$  ;  $0.08\text{ N}$
  - (C)  $1.20\text{ N}$  ;  $0.8\text{ N}$
  - (D)  $1.28\text{ N}$  ;  $0.8\text{ N}$
31. A porter applies a force to lift a luggage from the ground to put it on his head. The force of gravity also acts on the luggage. Work is done by the porter as well as by the force of gravity. Select the CORRECT statement regarding the work done by the two.
- (A) Both do positive work
  - (B) Both do negative work
  - (C) Work done by the porter is +ve while the work done by force of gravity is -ve.
  - (D) Work done by the porter is -ve while the work done by force of gravity is +ve.
32. The characteristics of sound which enables us to discriminate one sound from another having same amplitude and frequency but produced by different sources is called
- (A) music
  - (B) pitch
  - (C) quality
  - (D) intensity
33. The magnification 'm' of an image formed by a spherical mirror is negative. It means the image is formed by
- (A) Concave mirror and it is smaller than the object
  - (B) Concave mirror and it is inverted
  - (C) Concave mirror and it is larger than the object
  - (D) Convex mirror and it is smaller than the object



34. A candle flame is placed in front of a convex lens and its same size image is formed on a screen placed on the other side of the lens at 20 cm from it. On replacing this lens by another lens, the image on the screen disappear, but an enlarged and erect image of the candle flame is seen through the lens. Based on this information it can be concluded that the second lens is a

- (A) diverging lens of focal length – 20 cm
- (B) diverging lens of focal length – 10 cm
- (C) converging lens of focal length 15 cm
- (D) converging lens of focal length more than 20 cm

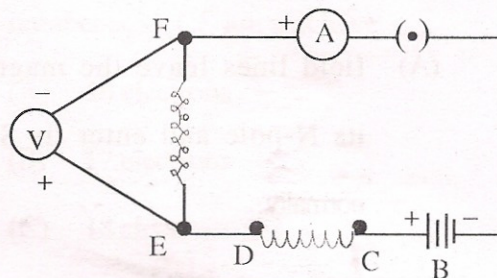
35. A person with a defective vision require spectacles of power – 0.25 dioptre. From this information it is clear that the person is suffering from

- (A) hypermetropia and the focal length of the correcting lens is 4 m
- (B) hypermetropia and the focal length of the correcting lens is 2.5 m
- (C) myopia and the focal length of the correcting lens is – 4 m
- (D) myopia and the focal length of the correcting lens is – 2.5 m

36. In the formation of a rainbow reflection, refraction and dispersion of light are involved. The correct sequence of these phenomena in the formation of a rainbow is

- (A) refraction, internal reflection, dispersion, refraction
- (B) dispersion, refraction, internal reflection, refraction
- (C) refraction, dispersion, internal reflection, refraction
- (D) refraction, internal reflection, refraction, dispersion

37. A student sets up his circuit for finding the equivalent resistance of a series combination of two resistors in a manner as shown. But because of a mistake in the circuit he did not get the correct result. The mistake can be corrected by shifting the

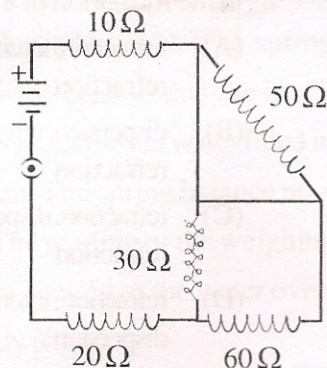


- (A) ammeter and connecting it between D and E
- (B) ammeter and connecting it between B and C
- (C) voltmeter and connecting it across C and D with proper polarity
- (D) voltmeter and connecting it across C and F with proper polarity



38. In the given circuit the **ineffective** resistor is

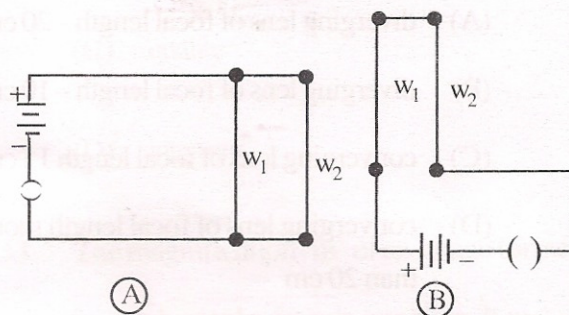
- (A)  $20\Omega$   
(B)  $30\Omega$   
(C)  $50\Omega$   
(D)  $60\Omega$



39. Select **INCORRECT** statements regarding magnetic field lines of a bar magnet

- (A) field lines leave the magnet at its N-pole and enter its S-pole normally  
(B) field lines are closer together where magnetic force is greater  
(C) field lines attract each other sidewise  
(D) field lines act like closed elastic loops that tend to shorten

40. In the diagram two neighbouring current carrying parallel wires  $w_1$  and  $w_2$  are shown connected to a battery in two different ways in the circuits A and B. Due to interaction of the magnetic fields in between these two wires  $w_1$  and  $w_2$  there will be



- (A) attraction between the wires in A and B both  
(B) repulsion between the wires in A and B both  
(C) attraction between the wires in A and repulsion in B  
(D) attraction between the wires in B and repulsion in A



41. Suppose there is a horizontal loop of conducting wire suspended in air and a strong bar magnet is made to fall through this loop with a constant speed. If the north pole of the magnet enters the loop first, the induced current in the loop (as viewed from above) at the instance when south pole of the magnet leaves the loop will be
- zero
  - clockwise
  - anticlockwise
  - first clockwise and then anticlockwise
42. Select TRUE statement about nuclear fission reactions
- In these reactions nucleus of the atom remain unaffected
  - No new nucleus is formed in a nuclear fission reaction
  - In nuclear fission the nucleus of a heavy atom when bombarded with high energy neutrons split apart into lighter nuclei.
  - In nuclear fission reactions the nucleus of a heavy atom is bombarded with low energy neutrons to obtain tremendous amount of energy
43. Rate of evaporation will be **decreased** if
- Surface area is increased
  - Temperature is increased
  - Humidity is increased
  - Wind speed increases
44. Milk is an example of
- Suspension
  - True solution
  - Colloidal solution
  - Homogeneous solution
45. Atomic number of chlorine is 17 and its mass number is 35.  $\text{Cl}^-$  ion will have
- 16 electrons
  - 17 electrons
  - 18 electrons
  - 35 electrons
46. Which has greatest number of atoms ?  
(Atomic mass of  $\text{H} = 1\text{u}$ ,  $\text{C} = 12\text{u}$ ,  $\text{O} = 16\text{u}$  and  $\text{Na} = 23\text{u}$ ) 100 g of
- 10g of Hydrogen
  - 100g of Carbon
  - 150g of Oxygen
  - 200g of Sodium



47. The pair of isotopes is
- $^{40}_{18}\text{Ar}$  and  $^{40}_{20}\text{Ca}$
  - $^{35}_{17}\text{Cl}$  and  $^{37}_{17}\text{Cl}$
  - $^4_2\text{He}$  and  $^4_3\text{Li}$
  - $^{24}_{11}\text{Na}$  and  $^{24}_{12}\text{Mg}$
48. The neutral nature of atom was proposed by
- Rutherford
  - Niels Bohr
  - J.J. Thomson
  - Chadwick
49. The shining brown element x on heating in air turns black and a new compound y is formed. The element x and compound y are respectively
- Fe, FeO
  - Cu, Cu(OH)<sub>2</sub>
  - Cu, CuO
  - Al, Al<sub>2</sub>O<sub>3</sub>
50. Galvanized iron is iron coated with
- Copper
  - Lead
  - Tin
  - Zink
51. The pH of a sample y is found to be 10. This sample may be of
- NaOH (Aq)
  - HCl (Aq)
  - H<sub>2</sub>O
  - CH<sub>3</sub>COOH (aq)
52. The aqueous solution of which one of the following salts will be acidic ?
- NaHCO<sub>3</sub>
  - NaCl
  - NH<sub>4</sub>Cl
  - CH<sub>3</sub>COONa
53. Which one of the following metals will not liberate hydrogen gas when treated with dilute hydrochloric acid ?
- Magnesium
  - Copper
  - Zinc
  - Tin
54. Which type of ore is changed into oxide by heating strongly in absence of excess of air?
- Sulphide
  - Nitrate
  - Bromide
  - Carbonate



55. The functional group present in carboxylic acids is
- OH
  - CHO
  - CO–
  - COOH
56. When ethanol is heated at 443K in the presence of conc.  $\text{H}_2\text{SO}_4$ , the product is
- ethene
  - ethyl ethanoate
  - ethyl ethoxide
  - ethane
57. The smallest atomic radius among the following is that of
- ${}^3\text{Li}$
  - ${}^9\text{F}$
  - ${}^{19}\text{K}$
  - ${}^{35}\text{Br}$
58. What is the atomic number of an element of period 3 and group 17 of the periodic table
- 3
  - 10
  - 14
  - 17
59. Charcoal and coke are formed by the process of
- Fractional distillation
  - Destructive distillation
  - Carbonisation
  - Reduction
60. The pair of organisms having autotrophic mode of nutrition is
- Amoeba and Hydra
  - Spirogyra and Vallisneria
  - Yeast and Penicillium
  - Mushroom and Cuscuta
61. Rohu, Mrigal and Catla fish are the examples of
- freshwater fish
  - marine fish
  - aquarium fish
  - non edible fish
62. Gymnosperms and angiosperms are grouped under
- liverworts
  - thallophyta
  - spermatophyta
  - tracheophyta



63. Bacteria cannot survive in a highly salted pickle because
- (A) bacteria get plasmolysed and are consequently killed
  - (B) Salt inhibits reproduction
  - (C) The pickle does not contain nutrients necessary for bacteria to live
  - (D) bacteria do not get enough light for photosynthesis
64. Phloem is related to the process of
- (A) photosynthesis
  - (B) translocation
  - (C) respiration
  - (D) transpiration
65. The sets of cell organelles which contain DNA is
- (A) nucleus, ribosomes, centrosomes
  - (B) centrosomes, nucleus, chloroplast
  - (C) chloroplast, nucleus, lysosomes
  - (D) nucleus, mitochondria, chloroplast
66. During respiration, the pyruvates are formed in
- (A) mitochondria
  - (B) cytoplasm
  - (C) nucleus
  - (D) lungs
67. Oxygenated blood is pumped to different parts of the body by
- (A) right ventricle
  - (B) left atrium
  - (C) left ventricle
  - (D) right atrium
68. After its formation, the urine leaves kidneys through
- (A) ureters
  - (B) urinary bladder
  - (C) urethra
  - (D) renal vein
69. In a reflex action, the stimulus passes through
- (A) receptor – dorsal root – spinal cord – brain – effector
  - (B) receptor – dorsal root – spinal cord – ventral root – effector
  - (C) receptor – dorsal root – brain – ventral root – effector
  - (D) receptor – brain – dorsal root – effector



70. In humans the embryo becomes implanted in the wall of
- (A) ovary
  - (B) uterus
  - (C) oviduct
  - (D) cervix
71. On crossing two pea plants, the progeny obtained consisted of 75.2% tall and 24.8% dwarf. The parents were probably
- (A) pure dwarf and pure tall
  - (B) pure tall and hybrid tall
  - (C) hybrid tall and pure dwarf
  - (D) hybrid dwarf and hybrid tall
72. Cabbage, Cauliflower, Kohlrabi are derived from wild cabbage plant. It is an example of
- (A) natural selection
  - (B) genetic drift
  - (C) artificial selection
  - (D) gene migration
73. A food web in a typical freshwater pond will start with
- (A) chlamydomonas, phytoplankton and hydrilla
  - (B) saprophytic fungi, bacteria and algae
  - (C) ratifers, water fleas and protozoa
  - (D) water snails, mosquito larvae and volvox
74. Which one of the following is non biodegradable
- (A) polythene bag
  - (B) paper bag
  - (C) cotton bag
  - (D) jute bag
75. In which of the following would you expect to find the highest concentration of pesticides
- (A) frog
  - (B) snakes
  - (C) green plant
  - (D) caterpillars