

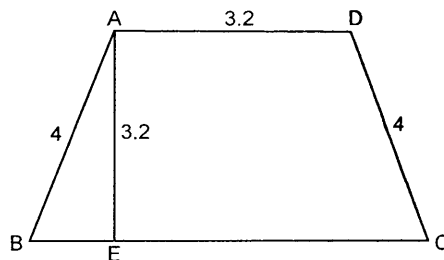
**General Ability Test****Maximum Time: 60 min**  
**Maximum Marks: 100**

Read the following instructions very carefully before you proceed:

- (i) There are two sections namely - Section 1: Mathematical Ability & Section 2: Analytical Ability.
- (ii) There are 40 questions in the Question Paper, 20 questions in each section. You have to attempt all of them.
- (iii) Each question carries 2.5 marks. There would be negative marking for the wrong answer (s). For every wrong answer 1 mark would be deducted.
- (iv) A list of formulae will be provided to you for your reference.

**Section Title: Mathematical Ability****Total No. Of Questions : 20**

1. In the figure shown below,
- $AB = 4$
- cm,
- $CD = 4$
- cm,
- $AE = 3.2$
- cm. The value of
- $BC$
- is?



$$\begin{array}{r} \sqrt{16 - 10.24} \\ 5.76 \\ 2.4 \\ \hline 2.4 \end{array}$$

- (a) 6 cm
  - (b) 8 cm
  - (c) 9 cm
  - (d) 7.5 cm
2. Find a simple discount equivalent to the discount series 30%, 20%, 10%?
- (a) 60%
  - (b) 53%
  - (c) 49.6%
  - (d) 48.5%



3. The interior angles of a pentagon are  $a^\circ$ ,  $(a + 20)^\circ$ ,  $(a + 40)^\circ$ ,  $(a + 60)^\circ$  and  $(a + 80)^\circ$ . The smallest angle of the pentagon is?

- (a)  $58^\circ$   
 (b)  $68^\circ$   
 (c)  $88^\circ$   
 (d) Cannot be determined

$$5a + 200 = 540$$

$$5a = 340$$

$$a = \frac{340}{5} = 68$$

4. A man buys oranges at the rate of 9 for Rs. 1.60 and sells them at the rate of 11 for Rs. 2. What does he gain or lose?

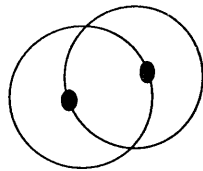
- (a) 40 paise  
 (b)  $2\frac{1}{11}\%$   
 (c)  $2\frac{3}{11}\%$   
 (d)  $1\frac{3}{11}\%$

$$99 \times 1.60 = 158.4$$

$$11 \times 2 = 22$$

$$158.4 + 22 = 180.4$$

5. In the figure given below, two circles, each of radius 4 cm, intersect each other. The centers of the circles pass through each other. The length of common chord is?



- (a)  $2\sqrt{3}$  cm  
 (b)  $3\sqrt{3}$  cm  
 (c)  $4\sqrt{3}$  cm  
 (d) 4 cm

6. In an examination, 80% of the examinees passed in English, 85% passed in Mathematics and 75% passed in both English and Mathematics. If 45 examinees failed in both English and Mathematics, then the numbers of examinees were?

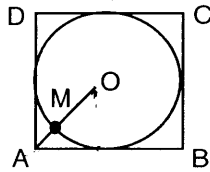
- (a) 450  
 (b) 400  
 (c) 350  
 (d) 300

80% E  
 85% M  
 75% E & M  
 45 failed in both E & M

$$0.75x + 45 = ?$$

$$\frac{10(\sqrt{2}+1)}{2-1}$$

7. In the given figure, O is the centre of the circle inscribed in a square ABCD. If MA = 5cm then AB is



- (a)  $5 + 5\sqrt{2}$   
 (b)  $10 + 10\sqrt{2}$   
 (c)  $5\sqrt{2} - 5$   
 (d)  $10\sqrt{2} - 10$

$$x+5 = \sqrt{x^2 + x^2}$$

$$(x+5)^2 = x^2 + x^2$$

$$x^2 + 10x + 25 = 2x^2$$

$$-x^2 + 10x + 25 = 0$$

$$x = \frac{-10 \pm \sqrt{100 - 100}}{2}$$

$$x = \frac{-10 \pm 0}{2}$$

$$x = -5$$

8. A motor car completes a journey in 10 hours, the first half at 21 km per hour and the rest at 24 km per hour. Find the distance travelled by it?

- (a) 240 km  
 (b) 225 km  
 (c) 224 km  
 (d) 220 km

$$\frac{x}{21} + \frac{x}{24} = 10$$

$$\frac{x}{42} + \frac{x}{48} = 10$$

$$48x + 42x = 10 \times 42 \times 48$$

$$90x = 10 \times 42 \times 48$$

$$x = \frac{10 \times 42 \times 48}{90}$$

$$x = 224$$

9. Consider the following statements:  
 I. If three sides of a triangle are equal to three sides of another triangle respectively, then the triangles are congruent.  
 II. If three angles of a triangle are equal to three angles of another triangle, respectively, then the two triangles are congruent.

Out of these 2 statements :

- (a) I alone is correct.  
 (b) I and II are false.  
 (c) I and II are correct.  
 (d) II above is correct.

10. Three bells toll at intervals of 36 seconds, 40 seconds and 48 seconds, respectively. They start ringing together at particular time. They will toll next time together after?

- (a) 6 minutes  
 (b) 12 minutes  
 (c) 18 minutes  
 (d) 24 minutes

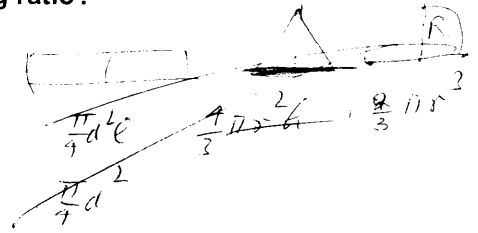
$$36 \quad 40 \quad 48$$

$$20 \quad 18 \quad 15$$

$$\hline 720$$

11. A right circular cylinder, a right circular cone and a hemisphere all have equal base areas and heights. The volumes would have the following ratio?

- (a) 1: 2:3
- (b)  $3: \frac{1}{3} : 2$
- (c)  3: 1: 2
- (d) 2: 1: 3



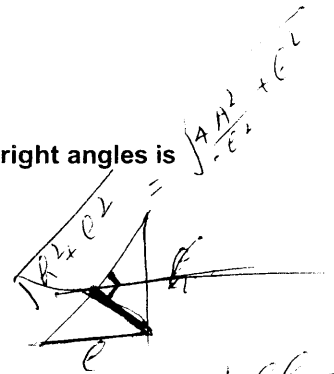
12. The value of  $\sin \theta$  in terms of  $\sec \theta$  is?

- (a)   $\frac{\sqrt{\sec^2 \theta - 1}}{\sec \theta}$
- (b)  $\frac{1}{\sqrt{\sec^2 \theta - 1}}$
- (c)  $\frac{\sec^2 \theta}{\sqrt{\sec^2 \theta - 1}}$
- (d)  $\sqrt{\sec^2 \theta - 1}$

Handwritten derivation:  $\sec^2 \theta = 1 + \tan^2 \theta = 1 + \frac{\sin^2 \theta}{\cos^2 \theta}$   
 $\frac{\tan \theta \sin \theta}{\sec \theta}$

13. The area of a right triangle is  $A$  and one of its sides containing the right angles is  $l$ . The altitude on the hypotenuse is?

- (a)  $2A/l^2$
- (b)   $\frac{2A}{\sqrt{4A^2 + l^4}}$
- (c)  $\frac{4A^2 + l^4}{2Al}$
- (d)  $\frac{2l^2 A}{3}$



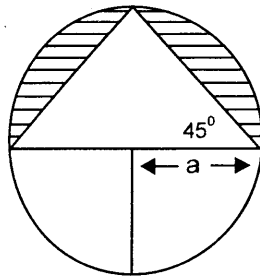
Handwritten derivation:  $h = \frac{1}{2} ch$   
 $h^2 = \frac{4A^2}{c^2}$   
 $\frac{1}{2} ab = \frac{1}{2} ch$   
 $h = \frac{2A}{c}$

14. The value of  $\cos^2 \left( \frac{\pi}{4} \right) - \cos^4 \left( \frac{\pi}{6} \right) + \sin^4 \left( \frac{\pi}{6} \right) + \sin^4 \left( \frac{\pi}{3} \right)$  is?

- (a)  9/16
- (b) 7/16
- (c) 5/16
- (d) 3/16

Handwritten calculation:  $\frac{1}{2} - \frac{1}{8} + \frac{1}{16} + \frac{1}{16}$   
 $= \frac{8}{16} - \frac{2}{16} + \frac{1}{16} + \frac{1}{16}$   
 $= \frac{8-2+1+1}{16} = \frac{8}{16} = \frac{1}{2}$

15. The area of the shaded region in the following figure is?



- (a)  $\frac{1}{2}a^2\left(\frac{\pi}{2}-1\right)$  sq. unit  
 (b)  $a^2(\pi-1)$  sq. units  
 ✓ (c)  $a^2\left(\frac{\pi}{2}-1\right)$  sq. Units  
 (d)  $\frac{1}{2}a^2(\pi-1)$  sq. units

16. The value of  $x^2 - 6x + 13$  can never be less than?

- ✓ (a) 4  
 (b) 5  
 (c) 4.5  
 (d) 7

17. Find the cost of canvas required for a conical tent, whose height is 8 m and diameter of base 12 m, at the rate of Rs. 3.50 per square meter?

- (a) Rs. 600  
 (b) Rs. 620  
 (c) Rs. 640  
 ✓ (d) Rs. 660

18. If  $x + 1/x = 2$ ,  $x - 1/x$  is equal to?

- ✓ (a) 0  
 (b) 1  
 (c) 2  
 (d) 3

$$\frac{\pi a^2}{2} - \frac{1}{2} \times 2a \cdot a$$

$$A = \frac{\pi a^2}{2} - \frac{1}{2} \times 2a \cdot a$$

$$= a^2 \left( \frac{\pi}{2} - 1 \right)$$

$$\frac{1}{2} \times 6 \times 10$$

$$\frac{1}{2} \times 96$$

$$48$$

$$10 \times 8$$

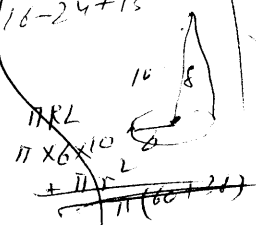
$$80$$

$$1 - 6 + 13 = 8$$

$$4 - 12 + 13 = 5$$

$$9 - 18 + 13 = 4$$

$$16 - 24 + 13 = 5$$



$$\pi r l + \pi r^2$$

$$\pi \times 6 \times 10 + \pi \times 6^2$$

$$60\pi + 36\pi$$

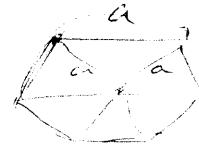
$$96\pi$$

$$96 \times \frac{22}{7}$$

$$2816$$

19. The side of a regular hexagon is  $a$ . Its area is?

- (a)  $\frac{3\sqrt{3}}{2} a^2$  sq. units
- (b)  $\frac{\sqrt{3}}{2} a^2$  sq. Units
- (c)  $2\sqrt{3}a^2$  sq. units
- (d)  $6 a^2$  sq. units.



Handwritten work for question 19:

$$A = \frac{1}{2} a \cdot \frac{\sqrt{3}a}{2}$$

$$= \frac{\sqrt{3}a^2}{4}$$

$$\times 6$$

$$= \frac{3\sqrt{3}a^2}{2}$$

20. The mean of 10 observations is 6.5. If the sum of nine observations equals 53, what is the tenth observation?

- (a) 15
- (b) 13.5
- (c) 12
- (d) 11

Section Title: Analytical Ability

Total No. Of Questions : 20

Directions for Question 21 to 25:

Two families are planning to go on a canoe trip together. The families consist of the following people: Robert and Mary Henderson and their three sons Tommy, Dan, and William; Jerome and Ellen Penick and their two daughters Kate and Susan.

There will be three canoes, with three people in each canoe. At least one of the four parents must be in each canoe. At least one person from each family must be in each canoe.

21. If the two mothers ride together in the same canoe, and the three brothers each ride in a different canoe, which of the following must be true?

- (a) Each canoe has both males and females in it.
- (b) One of the canoes has only females in it.
- (c) One of the canoes has only males in it.
- (d) The sisters ride in the same canoe.

22. If Ellen and Susan are together in one of the canoes, which of the following could be a list of the people together in another canoe?

- (a) Dan, Jerome, Kate
- (b) Dan, Jerome, William
- (c) Dan, Kate, Tommy
- (d) Jerome, Kate, Mary

23. If Jerome and Mary are together in one of the canoes, each of the following could be a list of the people together in another canoe except
- (a) Dan, Ellen, Susan
  - ~~(b)~~ Ellen, Robert, Tommy
  - (c) Ellen, Susan, William
  - (d) Ellen, Tommy, William
24. If each of the Henderson children ride in a different canoe, which of the following must be true?
- I The Penick children do not ride together.
  - II The Penick parents do not ride together.
  - III The Henderson parents do not ride together.
- ~~(a)~~ I only
  - (b) II only
  - (c) I & II only
  - (d) I & III only
25. On one of the days of the trip, while the canoeists go over rapids, Jerome chooses to go hiking with two of the children rather than canoeing, and there are six people in the canoes, two in each canoe. If the other conditions still hold for the canoeists, which of the following could be a list of the children in the canoe?
- ~~(a)~~ Dan, Kate, Susan
  - (b) Dan, Kate, William
  - (c) Dan, Tommy, William
  - (d) Dan, William, Susan

**Directions for Question 26 to 30:**

Exactly seven persons P, Q, R, S, T, U, and V- participate in and finish all of a series of swimming races. There are no ties for any position at the finish of any of the races. The following statements about the races are always true:

V finishes somewhere ahead of P.

P finishes somewhere ahead of Q.

Either R finishes first and T finishes last, or S finishes first and U or Q finishes last.

26. If in a race V finishes fifth, which of the following must be true?
- (a) S finishes first,
  - (b) R finishes second.
  - (c) T finishes third.
  - (d) Q finishes fourth.
27. If in a race R finishes first, V can finish no lower than.
- (a) Second
  - (b) Third
  - (c) Fourth
  - (d) Fifth

28. If in a race S finishes second, which of the following can be true?
- (a) V finishes before S.
  - (b) P finishes before V.
  - (c) T finishes before Q.
  - (d) U finishes before V.
29. If in a race S finishes sixth and Q finishes fifth, which of the following can be true?
- (a) V finishes first or fourth.
  - (b) R finishes second or third.
  - (c) P finishes second or fifth.
  - (d) U finishes third or fourth.
30. If in a race R finishes second and Q finishes fifth, which of the following must be true?
- (a) S finishes third.
  - (b) P finishes third.
  - (c) V finishes fourth.
  - (d) T finishes sixth.

**Directions for questions 31 to 34:**

A leading socialite decided to organize a dinner and invited a few of her friends. Only the host and the hostess were sitting at the opposite ends of a rectangular table, with three persons along each side. The pre-requisite for the seating arrangement was that each person must be seated such that at least on one side it has a person of opposite sex. Maqbool is opposite to Shobha, who is not the hostess. Ratan has a woman on his right and is sitting opposite to a woman. Monisha is sitting to the hostess's right, next to Dhirubhai. One person is seated between Madhruai and Urmila who is not the hostess. The men were Maqbool, Ratan, Dhirubhai and Jackie, while the women were Madhuri, Urmila, Shobha and Monisha.

31. The eighth person present, Jackie, must be...
- I. The host.
  - II. Seated to Shobha's right.
  - III. Seated opposite Urmila.
- (a) I only
  - (b) III only
  - (c) I and II only
  - (d) II and III only



32. Which of the following persons is definitely not seated next to a person of the same sex ?

- (a) Maqbool
- (b) Madhuri
- (c) Jackie
- (d) Shobha

33. If Ratan would have exchanged seats with a person four places to his left, which of the following would have been true after the exchange?

- I. No one was seated between two persons of the opposite sex (e.g. no man was seated between two women)
- II. One side of the table consisted entirely of persons of the same sex.
- III. Either the host or the hostess changed seats.

- (a) I only
- (b) II only
- (c) I and II only
- (d) II and III only

34. If each person is placed directly opposite to her spouse, which of the following pairs must be married?

- (a) Ratan and Monisha
- (b) Madhuri and Dhirubhai
- (c) Urmila and Jackie
- (d) Ratan and Madhuri

**Directions for questions 35 to 38:**

**Answer the questions based on the information given below.**

**At a certain restaurant, above the kitchen door there are four small lights, arranged side by side, and numbered consecutively, left to right, from one to four. The lights are used to signal waiters when orders are ready. On a certain shift there are exactly five waiters – David, Ed, Flint, Guy, and Hank.**

**To signal David, all four lights are illuminated.**

**To signal Ed, only lights one and two are illuminated.**

**To signal Flint, only light one is illuminated.**

**To signal Guy, only lights two, three, and four are illuminated.**

**To signal Hank, only lights three and four are illuminated.**

35. If lights two and three are both off, then the waiter signaled is

- (a) David
- (b) Ed
- (c) Flint
- (d) Guy

36. If lights three and four are illuminated, then the signal of which of the following waiters might be displayed?

- I. David
- II. Guy
- II. Hank

- (a) I only
- (b) I and II only
- (c) II and III only
- (d) I, II, and III

37. If light one is not illuminated, then the signal of which of the following waiters might be displayed?

- I Ed
- II. Guy
- III. Hank

- (a) I only
- (b) I and II only
- (c) I and III only
- (d) II and III only

38. If light three is on and light two is off, then the waiter signaled is

- (a) David
- (b) Ed
- (c) Guy
- (d) Hank

Directions for questions 39 to 40:

A combination of three fabrics is being chosen to decorate a room. The fabrics must be chosen from a group of seven fabrics – F, G, H, J, K, L, and M – according to the following conditions:

1. If F or G is chosen, the other must also be chosen.
2. H and J cannot be chosen together.
3. Either H or F or both must be chosen.

39. Which of the following combinations of fabrics conforms to the conditions?

- (a) F, H, J
- (b) H, K, M
- (c) G, H, M
- (d) H, J, L

40. If J is chosen, which of the following pairs of fabrics must also be chosen?

- (a) F and G
- (b) F and M
- (c) G and H
- (d) H and K

## List of Formulae

### Trigonometry

1.  $2\pi$  radian =  $360^\circ$
2.  $\sin^2 A + \cos^2 A = 1$
3.  $1 + \tan^2 A = \sec^2 A$
4.  $1 + \cot^2 A = \operatorname{cosec}^2 A$
5.  $\sin(-\theta) = -\sin \theta$        $\cos(-\theta) = \cos \theta$
6.  $\sin(90 - \theta) = \cos \theta$        $\cos(90 - \theta) = \sin \theta$
7.  $\sin(90 + \theta) = \cos \theta$        $\cos(90 + \theta) = -\sin \theta$
8.  $\sin(180 - \theta) = \sin \theta$        $\cos(180 - \theta) = -\cos \theta$
9.  $\sin 2A = 2 \sin A \cos A$

### Statistics

1. The sum of the first  $n$  natural numbers,  $1 + 2 + 3 + \dots + n = \frac{n(n+1)}{2}$

### Mensuration

1. Area of a triangle =  $\frac{1}{2}$  Base  $\times$  Height
2. Area of a triangle =  $\sqrt{s(s-a)(s-b)(s-c)}$       Where  $2s = a + b + c$
3. Area of an equilateral triangle =  $\sqrt{3}/4$  (side)<sup>2</sup>
4. Area of a rectangle = Length  $\times$  Breadth
5. Area of a parallelogram = Base  $\times$  Altitude
6. Area of a rhombus =  $\frac{1}{2}$  (product of diagonals)
7. Area of a trapezium =  $\frac{1}{2}$  (Altitude)  $\times$  (sum of parallel sides)
8. Circumference of a circle =  $2\pi r$
9. Area of a circle =  $\pi r^2$
10. Total surface area of cuboid with sides  $l, b, h = 2(lb + bh + lh)$   
Volume of cuboid =  $lbh$ , Surface area of cube =  $6(\text{side})^2$
11. Cylinder  
Curved surface area =  $2\pi rh$ ; Total surface area =  $2\pi r^2 + 2\pi rh$   
Volume =  $\pi r^2 h$
12. Cone  
Vertical height =  $h$ ; Slant height =  $\ell$ ; Area of curved surface =  $\pi r \ell$   
Total surface area =  $\pi r^2 + \pi r \ell$       Volume =  $1/3 \pi r^2 h$
13. Sphere  
Surface area =  $4\pi r^2$ ; Volume =  $\frac{4}{3}\pi r^3$

## Geometry

1. The sum of two sides of a triangle is greater than the third.
2. The sum of the interior angles of a polygon of  $n$  sides  $= (n - 2) \pi$ .
3. The angle inscribed in any semicircle is  $\pi/2$ .
4. Two tangents can be drawn from any external point to a circle. These are equal in length.
5. Angles in alternate segments are equal.
6. Angles in equal segments are equal.

## Algebra

1.  $A^2 - B^2 = (A - B)(A + B)$
2.  $(A + B)^2 = A^2 + 2AB + B^2$
3.  $(A - B)^2 = A^2 - 2AB + B^2$
4.  $(A + B + C)^2 = A^2 + B^2 + C^2 + 2(AB + BC + CA)$
5. Quadratic Equations - Any equation of the form  $ax^2 + bx + c = 0$ ,  $a \neq 0$ , is known as a quadratic equation. Its roots are given by  $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$   
Sum of the roots  $= -b/a$ , Product of the roots  $= c/a$   
Nature of the roots depends on the quantity  $D = b^2 - 4ac$ , which is known as the Discriminant.

## Arithmetic

1.  $x\% \text{ of } p = \frac{p}{100}$ ; Profit = S.P. - C.P.; Loss = C.P. - S.P.

2. Simple Interest  $= \frac{P \times T \times R}{100}$ ; Where P = principal, T = time, in years, R = rate

Compound interest = A - P : Where  $A = P \left(1 + \frac{R}{100}\right)^T$