Sample Paper 5

Time : 90 Minutes **Max Marks : 40**

General Instructions

1. *The question paper contains three parts A, B and C.*
2. *Section A consists of 20 quesions of 1 mark each. Any 16 quesitons are to be attempted.*
3. *Section B consists of 20 quersions of 1 mark each. Any 16 quesions are to be attempted.*
4. *Section C consists of 10 quesions based two Case Studies. Attempt any 8 questions.*
5. *There is no negative marking.*

SECTION-A

Section A consists of 20 questions of 1 mark each. Any 16 quesions are to be attempted.

1. If $x = 3 + 3^{2/3} + 3^{1/3}$, then the value of

$x^3 - 9x^2 + 18x - 12$ is

(a) 1 (b) 0 (c) –1 (d) 2

2. In ΔABC, AB = AC, P and Q are points on AC and AB respectively such that BC = BP = PQ = AQ. Then, ∠AQP is equal to (use π =180º)

(a) $\frac{2\pi}{7}$ (b) $\frac{3\pi}{7}$ (c) $\frac{4\pi}{7}$ (d) $\frac{5\pi}{7}$

3. If the circumference of a circle increases from 4π to 8π, then its area is

(a) halved (b) doubled (c) tripled (d) quadrupled

4. $(1 + \tan\theta + \sec\theta)(1 + \cot\theta - \operatorname{cosec}\theta) =$

(a) 0 (b) 1 (c) 2 (d) –1

5. If the point $P(p, q)$ is equidistant from the points $A(a + b, b - a)$ and $B(a - b, a + b)$, then

(a) $ap = by$ (b) $bp = ay$ (c) $ap + bq = 0$ (d) $bp + aq = 0$

6. In a classroom, one-fifth of the boys leave the class and the ratio of the remaining boys to girls is 2 : 3. If further 44 girls leave the class, then the ratio of boys to girls is 5: 2. How many more boys should leave the class so that the number of boys equals that of girls?

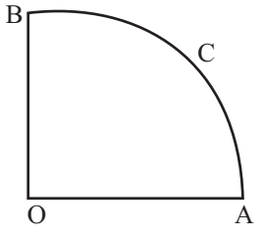
(a) 16 (b) 24 (c) 30 (d) 36

7. Consider a ΔPQR in which the relation $QR^2 + PR^2 = 5\,PQ^2$ holds. Let G be the points of intersection of medians PM and QN. Then $\angle QGM$ is always

(a) less than 45° (b) obtuse

(c) a right angle (d) acute and larger than 45°

8. In the adjoining figure, *OACB* is a quadrant of a circle of radius 7 cm. The perimeter of the quadrant is



(a) 11 cm (b) 18 cm (c) 25 cm (d) 36 cm

9. Let *ABC* be a triangle and *M* be a point on side *AC* closer to vertex *C* than *A*. Let *N* be a point on side *AB* such that *MN* is parallel to *BC* and let *P* be a point on side *BC* such that *MP* is parallel to *AB*. If the area of the quadrilateral *BNMP* is equal to $\frac{5}{18}$ of the area of ΔABC, then the ratio *AM*/*MC* equals

(a) 5 (b) 6 (c) $\frac{18}{5}$ (d) $\frac{15}{2}$

10. Let $a_1, a_2, ..., a_{100}$ be non-zero real numbers such that $a_1 + a_2 + ... + a_{100} = 0$

Then,

(a) $\sum_{i=1}^{100} a_i 2^{a_i} > 0$ and $\sum_{i=1}^{100} a_i 2^{-a_i} < 0$ (b) $\sum_{i=1}^{100} a_i 2^{a_i} \geq 0$ and $\sum_{i=1}^{100} a_i 2^{-a_i} \geq 0$

(c) $\sum_{i=1}^{100} a_i 2^{a_i} \leq 0$ and $\sum_{i=1}^{100} a_i 2^{-a_i} \leq 0$ (d) The sign of $\sum_{i=1}^{100} a_i 2^{a_i}$ or $\sum_{i=1}^{100} a_i 2^{-a_i}$ depends on the choice of a_i's

11. The points *A* (– 4, – 1), *B* (–2, – 4), *C* (4, 0) and *D* (2, 3) are the vertices of a

(a) Parallelogram (b) Rectangle (c) Rhombus (d) Square

12. For what value of *p*, the following pair of linear equations in two variables will have infinitely many solutions ?
$px + 3y - (p - 3) = 0$, $12x + py - p = 0$

(a) 6 (b) – 6 (c) 0 (d) 2

13. If $x^2 - 4$ is the factor of $2x^3 + k_1x^2 + k_2x + 12$, where k_1, k_2 are constant, then the value of $k_1 + k_2$ is

(a) 11 (b) 5 (c) –11 (d) –5

14. If a circular grass lawn of 35m in radius has a path 7m wide running around it on the outside, then the area of the path is

(a) 1450 m^2 (b) 1576 m^2 (c) 1694 m^2 (d) 3368 m^2

15. $9 \sec^2 A - 9 \tan^2 A =$

(a) 1 (b) 9 (c) 8 (d) 0

16. Three - digit numbers formed by using digits 0, 1, 2 and 5 (without repetition) are written on different slips with distinct number on each slip, and put in a bowl. One slip is drawn at random from the bowl. The probability that the slip bears a number divisible by 5 is

(a) $\frac{5}{9}$ (b) $\frac{4}{9}$ (c) $\frac{2}{3}$ (d) $\frac{1}{3}$

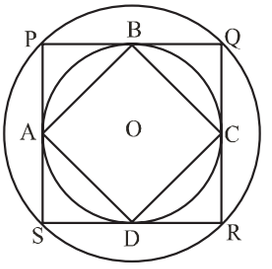
17. The graphs of the equations $x - y = 2$ and $kx + y = 3$, where *k* is a constant, intersect at the point (x, y) in the first quadrant, if and only if *k* is

(a) equal to –1 (b) greater than –1 (c) less than 3/2 (d) lying between –1 and 3/2

18. The value of $0.\overline{235}$ is :

(a) $\frac{233}{900}$ (b) $\frac{233}{990}$ (c) $\frac{235}{999}$ (d) $\frac{235}{990}$

19. The figure below shows two concentric circles with centre O. $PQRS$ is a square inscribed in the outer circle. It also circumscribes the inner circle, touching it at point B, C, D and A. The ratio of the perimeter of the outer circle to that of polygon $ABCD$ is



(a) $\frac{\pi}{4}$ (b) $\frac{3\pi}{2}$ (c) $\frac{\pi}{2}$ (d) π

20. Let P be an interior point of a ΔABC. Let Q and R be the reflections of P in AB and AC, respectively. If Q, A, R are collinear, then $\angle A$ equals

(a) 30° (b) 60° (c) 90° (d) 120°

SECTION-B

Section B consists of 20 questions of 1 mark each. Any 16 quesions are to be attempted.

21. Consider the following statements: For any integer n,

I. $n^2 + 3$ is never divisible by 17.

II. $n^2 + 4$ is never divisible by 17.

Then,

(a) both I and II are true (b) both I and II are false

(c) I is false and II is true (d) I is true and II is false

22. A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought?

(a) 40 (b) 240 (c) 480 (d) 750

23. $\frac{2\tan 30°}{1-\tan^2 30°} =$

(a) cos 60° (b) sin 60° (c) tan 60° (d) sin 30°

24. The average incomes of the people in two villages are P and Q respectively. Assume that $P \neq Q$. A person moves from the first village to the second village. The new average incomes are P' and Q' respectively. Which of the following is not possible?

(a) $P' > P$ and $Q' > Q$ (b) $P' > P$ and $Q' < Q$

(c) $P' = P$ and $Q' = Q$ (d) $P' < P$ and $Q' < Q$

25. If the value of a quadratic polynomial p(x) is 0 only at x = –1 and p(–2) = 2, then the value of p(2) is

(a) 18 (b) 9 (c) 6 (d) 3

26. If the sector of a circle of diameter 10 cm subtends an angle of 144° at the centre, then the length of the arc of the sector is

(a) 2π cm (b) 4π cm (c) 5π cm (d) 6π cm

27. x and y are two non-negative numbers such that $2x + y = 10$. The sum of the maximum and minimum values of $(x + y)$ is

(a) 6 (b) 9 (c) 10 (d) 15

28. The area of a sector of angle p (in degrees) of a circle with radius R is

(a) $\frac{p}{360°} \times 2\pi R$ (b) $\frac{p}{180°} \times \pi R^2$ (c) $\frac{p}{720°} \times 2\pi R$ (d) $\frac{p}{720°} \times 2\pi R^2$

29. sin 2A = 2 sin A is true when A =

(a) 0° (b) 30° (c) 45° (d) 60°

30. Given that $\frac{1}{7} = 0.\overline{142857}$, which is a repeating decimal having six different digits. If x is the sum of such first three positive integers n such that $\frac{1}{n} = 0.\overline{abcdef}$, where a, b, c, d, e and f are different digits, then the value of x is

(a) 20 (b) 21 (c) 41 (d) 42

31. For an event E, P (E) + $P(\overline{E}) = q$, then

(a) $0 \le q < 1$ (b) $0 < q \le 1$ (c) $0 < q < 1$ (d) None of these

32. A boat travels with a speed of 15 km/hr in still water. In a river flowing at 5 km/hr, the boat travels some distance downstream and then returns. The ratio of average speed to the speed in still water is

(a) 8 : 3 (b) 3 : 8 (c) 8 : 9 (d) 9 : 8

33. If the polynomials $ax^3 + 4x^2 + 3x - 4$ and $x^3 - 4x +$ a leave the same remainder when divided by $x - 3$, then the value of a is

(a) 1 (b) –1 (c) 19/14 (d) –5/14

34. Which of the following relationship is the correct ?

(a) $P(E) + P(\overline{E}) = 1$ (b) $P(\overline{E}) - P(E) = 1$

(c) $P(E) = 1 + P(\overline{E})$ (d) None of these

35. $\frac{1 - \tan^2 45°}{1 + \tan^2 45°} =$

(a) tan 90° (b) 1 (c) sin 45° (d) 0

36. The sum of two numbers is 528 and their H.C.F. is 33, then find the number of pairs of numbers satisfying the above conditions.

(a) 4 (b) 5 (c) 6 (d) 2

37. A man can row a boat in still water at the rate of 6 km per hour. If the stream flows at the rate of 2 km/hr, he takes half the time going downstream than going upstream the same distance. His average speed for upstream and down stream trip is

(a) 6 km/hr (b) 16/3 km/hr

(c) Insufficient data to arrive at the answer (d) none of the above

38. A quadratic polynomial when divided by $x + 2$ leaves a remainder of 1 and when divided by $x - 1$, leaves a remainder of 4. What will be the remainder if it is divided by $(x + 2)(x - 1)$?

(a) 1 (b) 4 (c) $x + 3$ (d) $x - 3$

39. $\frac{2 \tan 30°}{1 + \tan^2 30°} =$

(a) sin 60° (b) cos 60° (c) tan 60° (d) sin 30°

40. The unit digit in the expression $55^{725} + 73^{5810} + 22^{853}$ is

(a) 0 (b) 4 (c) 5 (d) 6

SECTION-C

Case Study Based Questions:

Section C consists of 10 quesions of 1 mark each. Any 8 quesions are to be attempted.

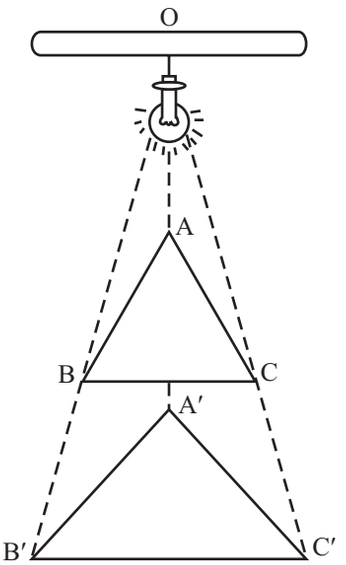
Q 41. - Q 45 are based on case study-I

Case Study-I

Place a lighted bulb at a point O on the ceiling and directly below it a table in classroom. Place ΔABC shape cardboard parallel to the ground between the lighted bulb and the table. Then a shadow of ΔA′B′C′ is cost on the table such that ΔABC ~ ΔA′B′C′ shown in figure.

If AB = 5 cm, A′B′ = 15 cm; B′C′ = 12 cm,

AC = 3 cm, ∠B′ = 60° and ∠A = 80°.



Answer the following questions.

41. Length of A′C′ is :

(a) 3 cm (b) 4 cm (c) 9 cm (d) 12 cm

42. Length of BC is :

(a) 4 cm (b) 12 cm (c) 3 cm (d) 15 cm

43. Measure of ∠A′ is :

(a) 60° (b) 80° (c) 180° (d) 40°

44. Find the measure of ∠B.

(a) 60° (b) 40° (c) 80° (d) 180°

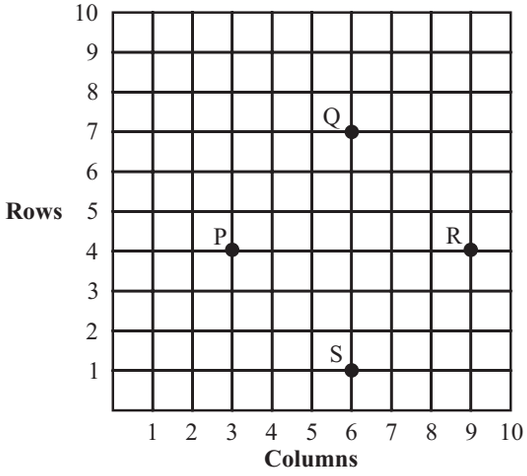
45. Find the measure of ∠C.

(a) 60° (b) 40° (c) 80° (d) 180°

Q 46 - Q 50 are based on case study-II

Case Study-II

In a classroom, 4 friends are seated at the points P, Q, R and S as shown in figure. Then answer the following questions.



46. The coordinate of P is :

(a) (4, 3) (b) (3, 4) (c) (6, 1) (d) (6, 7)

47. The distance of PQ is :

(a) $3\sqrt{2}$ unit (b) 4 unit (c) $2\sqrt{3}$ unit (d) 6 unit

48. The distance of PR is :

(a) 7 unit (b) $6\sqrt{2}$ unit (c) 6 unit (d) 5 unit

49. The name of quadrilateral is :

(a) Square (b) Rectangle (c) Rhombus (d) Parallelogram

50. The mid point of QS is :

(a) (5, 4) (b) (7, 4) (c) (6, 2) (d) (6, 4)

OMR ANSWER SHEET

Sample Paper No – ☐

- ✶ Use Blue / Black Ball pen only.
- ✶ Please do not make any atray marks on the answer sheet.
- ✶ Rough work must not be done on the answer sheet.
- ✶ Darken one circle deeply for each question in the OMR Answer sheet, as faintly darkend / half darkened circle might by rejected.

Start time : _____ End time _____ Time taken _____

1. Name (in Block Letters)

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2. Date of Exam

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3. Candidate's Signature ☐

SECTION-A

1.	(a)	(b)	(c)	(d)	9.	(a)	(b)	(c)	(d)	17.	(a)	(b)	(c)	(d)
2.	(a)	(b)	(c)	(d)	10.	(a)	(b)	(c)	(d)	18.	(a)	(b)	(c)	(d)
3.	(a)	(b)	(c)	(d)	11.	(a)	(b)	(c)	(d)	19.	(a)	(b)	(c)	(d)
4.	(a)	(b)	(c)	(d)	12.	(a)	(b)	(c)	(d)	20.	(a)	(b)	(c)	(d)
5.	(a)	(b)	(c)	(d)	13.	(a)	(b)	(c)	(d)					
6.	(a)	(b)	(c)	(d)	14.	(a)	(b)	(c)	(d)					
7.	(a)	(b)	(c)	(d)	15.	(a)	(b)	(c)	(d)					
8.	(a)	(b)	(c)	(d)	16.	(a)	(b)	(c)	(d)					

SECTION-B

21.	(a)	(b)	(c)	(d)	29.	(a)	(b)	(c)	(d)	37.	(a)	(b)	(c)	(d)
22.	(a)	(b)	(c)	(d)	30.	(a)	(b)	(c)	(d)	38.	(a)	(b)	(c)	(d)
23.	(a)	(b)	(c)	(d)	31.	(a)	(b)	(c)	(d)	39.	(a)	(b)	(c)	(d)
24.	(a)	(b)	(c)	(d)	32.	(a)	(b)	(c)	(d)	40.	(a)	(b)	(c)	(d)
25.	(a)	(b)	(c)	(d)	33.	(a)	(b)	(c)	(d)					
26.	(a)	(b)	(c)	(d)	34.	(a)	(b)	(c)	(d)					
27.	(a)	(b)	(c)	(d)	35.	(a)	(b)	(c)	(d)					
28.	(a)	(b)	(c)	(d)	36.	(a)	(b)	(c)	(d)					

SECTION-C

41.	(a)	(b)	(c)	(d)	45.	(a)	(b)	(c)	(d)	49.	(a)	(b)	(c)	(d)
42.	(a)	(b)	(c)	(d)	46.	(a)	(b)	(c)	(d)	50.	(a)	(b)	(c)	(d)
43.	(a)	(b)	(c)	(d)	47.	(a)	(b)	(c)	(d)					
44.	(a)	(b)	(c)	(d)	48.	(a)	(b)	(c)	(d)					

No. of Qns. Attempted		Correct		Incorrect		Marks	

Page for Rough Work