X/25/M (OC)

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MATHEMATICS

(Old Course)

(FOR NON-REGULAR, PRIVATE AND COMPARTMENTAL CANDIDATES)

Full Marks : 80

Pass Marks : 24

Time : 3 hours

The figures in the margin indicate full marks for the questions

General Instructions :

(i) Please check that this Question Paper contains **55** questions.

(ii) For candidates without an Internal Assessment, their marks will be multiplied by 1·25 to adjust their total to a maximum of 100 marks.

(iii) 15 minutes time is given for the candidates to read the Question Paper. The Question Paper will be distributed 15 minutes before the scheduled time of the examination. In these 15 minutes, the candidates should only read the instructions and questions carefully and should not write answers on the Answer Sheet.

(iv) The Question Paper contains 4 Sections, **Section—A**, **B**, **C** and **D**.

[P.T.O.

(2)

(v) **Section—A** contains Multiple Choice Questions (MCQ). Choose the most appropriate answer from the given options. The answers to this Section must be provided in the boxes provided in the Answer Sheet. Answers given anywhere else will not be counted for marking.

(vi) **Section—B** contains Very Short Answer Questions. Answer the questions briefly, in minimum 3 steps.

(vii) **Section—C** contains Short Answer Questions. Answer the questions in minimum 5 steps.

(viii) **Section—D** contains Long Answer Questions. Answer the questions in minimum 8 steps.

(ix) Use of calculators/mobile phone/any electronic device is *not allowed*.

SECTION—A

Multiple choice questions (answer **all** questions) :   1×30=30

1. If $x = a$ and $y = b$ are the solutions of the equations $x - y = 2$ and $x + y = 4$, then the values of a and b are, respectively   1

   (A) 3 and 5

   (B) 3 and 1

   (C) 5 and 3

   (D) −1 and −3

2. The prime factorization of 4050 is   1

    (A) $2 \times 3^3 \times 5$

    (B) $2 \times 3^4 \times 5$

    (C) $2 \times 3^4 \times 5^2$

    (D) $2 \times 3^4 \times 5^3$

3. The decimal expansion of a rational number is always   1

    (A) non-terminating

    (B) non-terminating and non-repeating

    (C) terminating or non-terminating repeated

    (D) None of the above

4. The degree of a constant polynomial is   1

    (A) 2

    (B) 1

    (C) −1

    (D) 0

5. The sum of zeroes of the polynomial $p(x) = x^2 - 3x + 2$ is   1

    (A) 2

    (B) 3

    (C) −2

    (D) −3

6. The length of the altitude of an equilateral triangle of side 2 cm is   1

   (A) 3 cm

   (B) $\sqrt{3}$ cm

   (C) $\dfrac{\sqrt{3}}{2}$ cm

   (D) $\dfrac{2}{\sqrt{3}}$ cm

7. The system of equations $-3x + 4y = 5$ and $\dfrac{9}{2}x - 6y + \dfrac{15}{2} = 0$ has   1

   (A) a unique solution
   (B) infinite solutions
   (C) no solution
   (D) None of the above

8. If the roots of the equation $ax^2 + bx + c = 0$ are equal, then c equals to   1

   (A) $\dfrac{b}{2a}$

   (B) $-\dfrac{b}{2a}$

   (C) $\dfrac{b^2}{4a}$

   (D) $-\dfrac{b^2}{4a}$

[Contd.

9. The roots of the quadratic equation $x^2 + 4x + 4 = 0$ are   1

(A) (2, 0)

(B) (2, 2)

(C) (−2, −2)

(D) (2, −3)

10. The common difference of the AP

−5, −1, 3, 7, ...

is   1

(A) 2

(B) 4

(C) 3

(D) −4

11. The nth term of the AP with first term a and common difference d is given by   1

(A) $2a + (n-1)d$

(B) $a + 2(n-1)d$

(C) $a + \dfrac{n-1}{2}d$

(D) $a + (n-1)d$

           [P.T.O.

12. All geometrical congruent figures are   1

    (A) not similar

    (B) similar

    (C) unequal

    (D) None of the above

13. $\Delta ABC \sim \Delta DEF$, ar $(\Delta ABC) = 9$ cm^2, ar $(\Delta DEF) = 16$ cm^2. If $BC = 2 \cdot 1$ cm, then EF measures   1

    (A) 2·8 cm

    (B) 2·5 cm

    (C) 4·1 cm

    (D) 4·2 cm

14. In which quadrant does the point (–2, 6) lie?   1

    (A) 1st quadrant

    (B) 2nd quadrant

    (C) 3rd quadrant

    (D) 4th quadrant

15. Three points in a plane are collinear, if the area of the triangle formed by them is   1

    (A) 1

    (B) ½

    (C) – 1

    (D) 0

16. If $\cos\theta = 1$, then the value of θ is   1

  (A) 0°

  (B) 30°

  (C) 60°

  (D) 90°

17. The value of $9\sec^2\theta - 9\tan^2\theta$ is   1

  (A) 0

  (B) 1

  (C) 9

  (D) 10

18. A part of the circle, whose endpoints are endpoints of a diameter, is called a   1

  (A) circumference

  (B) segment

  (C) semicircle

  (D) perimeter

19. How many tangents can be drawn from a point outside the circle?   1

  (A) 2

  (B) 1

  (C) 3

  (D) 0

20. The tangents drawn at the endpoints of a diameter of a circle $C(0, r)$ are   1

    (A) equal

    (B) parallel

    (C) perpendicular

    (D) intersecting

21. A garden roller has circumference of 4 m. The number of revolutions it makes in moving 40 m is   1

    (A) 8

    (B) 10

    (C) 12

    (D) 16

22. The portion (or part) of the circular region enclosed between a chord and the corresponding arc is called a/an   1

    (A) arc of the circle

    (B) perimeter of the circle

    (C) sector of the circle

    (D) segment of the circle

23. If the circumference of a circle increases from 2π to 4π, then its area is   1

    (A) halved

    (B) doubled

    (C) tripled

    (D) four times

(9)

24. Which of the following remains same when one solid is converted to other?   1

(A) Surface area

(B) Volume

(C) Height

(D) Radius

25. If the surface area of a sphere is 616 cm^2, then its diameter is   1

(A) 7 cm

(B) 28 cm

(C) 14 cm

(D) 56 cm

26. The middlemost observation of every data arranged in order is called   1

(A) mode

(B) median

(C) mean

(D) deviation

27. If the mean of 6, 8, 5, 7, 4 and x is 7, then x equals to   1

(A) 12

(B) 24

(C) 28

(D) 30

28. The empirical relationship between mean, mode and median in asymmetrical distribution is   1

(A) mode = 2 median – 3 mean

(B) mode = median – 2 mean

(C) mode = 3 median – 2 mean

(D) mode = 2 median – mean

29. Which of the following cannot be the probability of an event?   1

(A) $\dfrac{2}{3}$

(B) –1·5

(C) 15%

(D) 0·7

30. If $P(E) = 0·05$, then $P(\bar{E})$ equals   1

(A) –0·05

(B) 0·5

(C) 0·9

(D) 0·95

(11)

SECTION—B

Very short answer questions (**any *six***) :   2×6=12

31. If a/b is a rational number $(b \neq 0)$ in its lowest form, what is the condition on b so that the decimal representation of a/b is terminating?   2

32. Find the HCF of 18 and 24.   2

33. Write the discriminant of $3x^2 - 2x + 8 = 0$.   2

34. Determine the value of k for which $2x + 3y - 5 = 0$ and $kx - 6y - 8 = 0$ have a unique solution.   2

35. Determine the nature of roots of the quadratic equation
$$6x^2 + 7x - 10 = 0$$ 2

36. Find the value of
$$\sin 60° \cos 30° + \cos 60° \sin 30°$$ 2

37. The perimeters of two similar triangles are 25 cm and 15 cm, respectively. If one side of first triangle is 9 cm, what is the corresponding side of the other triangle?   2

38. Prove that $(1 - \sin^2 \theta)\sec^2 \theta = 1$.   2

39. A die is thrown once. Find the probability of getting an even number.   2

SECTION—C

Short answer questions **(any *six*)** :   3×6=18

40. Solve the equation $10x - \dfrac{1}{x} = 3$ by factorization.   3

41. If α and β are the zeroes of the polynomial $p(x) = 3x^2 - 2x - 6$, then find $\alpha^2 + \beta^2$.   3

42. Divide 16 m into two parts such that twice the square of the greater part exceeds the square of the smaller part by 164.   3

43. Find the values of a when the distance between $P(a, -1)$ and $Q(5, 3)$ is 5 units.   3

44. If the points (2, 1) and (1, –2) are equidistant from the point (x, y), prove that $x + 3y = 0$.   3

45. The minute hand of a clock is 7 cm long. Find the area of the face of the clock by the minute hand between 9 a.m. and 9:35 a.m.   3
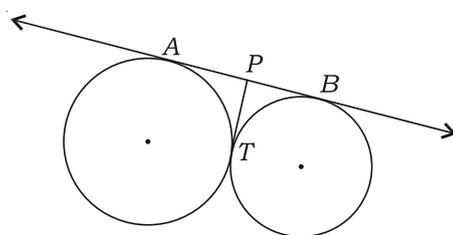
46.
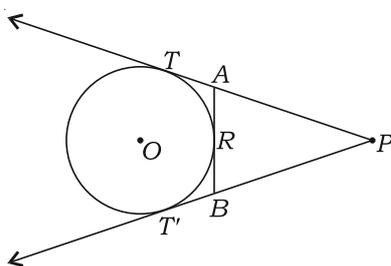
In the figure given above, *PT* and *PT'* are tangents from *P* to the circle with centre *O*. *R* is a point on the circle. Prove that $PA + AR = PB + BR$.   3

[For Visually Handicapped (Blind) students only instead of Question No. 46 given on Page 12]

46. *(a)* Define secant of a circle. 2

(b) A line which intersects the circle exactly at one point, is called a _____. (Fill in the blank) 1

47.

In the figure given above, *AB* is a common tangent to the given circles, which touches externally at *P*. If *AP* = 3·2 cm, find the length of *AB*. 3

[For Visually Handicapped (Blind) students only instead of Question No. 47 given above]

47. *(a)* Length of tangents from an external point on a circle is always less than the radius of the circle.

(State whether *True* or *False*) 1

(b) Define semicircle. 2

48. Find the mean of the following data : 3

Class Interval	0–10	10–20	20–30	30–40	40–50
Frequency	3	5	9	5	3

SECTION—D

Long answer questions **(any *four*)** :   5×4=20

49. Prove that if a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.   5

[For Visually Handicapped (Blind) students only instead of Question No. 49 given above]

49. *(a)* State Basic Proportionality Theorem.   3

(b) When are the two triangles said to be similar?   2

50. If the 10th term of an AP is 52 and the 17th term is 20 more than the 13th term, find the AP.   5

51. A toy is in the form of a cone of radius 3·5 cm mounted on a hemisphere of same radius. The total height of the toy is 15·5 cm. Find the total surface area of the toy. (Take $\pi = \frac{22}{7}$)   5

52. A straight highway leads to the foot of a tower of height 50 m. From the top of the tower, the angles of depression of two cars standing on the highway are 30° and 60°, respectively. What is the distance between the two cars and how far is each car from the tower? [Take $\sqrt{3}$ = 1·73]   5

(15)

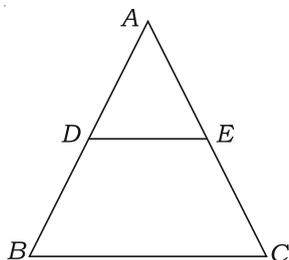**[For Visually Handicapped (Blind) students only instead of Question No. 52 given on Page 14]**

52. *(a)* Prove that

$$\frac{\sin 10°}{\cos 80°} + \cos 47° \cdot \operatorname{cosec} 43° = 2$$ 3

(b) Define angle of depression.   2

53. Find the sum of all 3-digit natural numbers which are multiples of 11.   5

54. In the figure given below, if $DE \| BC$, $AD = 4x - 3$, $AE = 8x - 7$, $BD = 3x - 1$ and $CE = 5x - 3$, find the value of x :   5

[For Visually Handicapped (Blind) students only instead of Question No. 54 given above]

54. *(a)* State AAA-similarity criterion.   2

(b) Define similar triangles.   3

55. $\triangle ABC$ is right-angled at A and $AD \perp BC$. If $BC = 13$ cm and $AC = 5$ cm, find the ratio of the areas of $\triangle ABC$ and $\triangle ADC$.   5

(**16**)

55. *(a)* State Pythagoras theorem. 3

(b) If two corresponding _____ of two triangles are equal, then the triangles are similar.

(Fill in the blank) 1

(c) The longest side of a right-angled triangle is called hypotenuse.

(State whether *True* or *False*) 1

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