7317

Register Number

MATHEMATICS

(English Version)

Time Allowed : 2 $\frac{1}{2}$ Hours] [Maximum Marks : 100

Instructions : i) This question paper consists of *four* Parts. Read the note carefully under each Part before answering them.

ii) Write legibly. The rough work should be shown at the bottom of the pages of the answer-book.

iii) Only the logarithmic and trigonometric tables issued at the centre should be used.

PART – A

(Marks : 15)

Note : i) This part contains *fifteen* questions. Answer *all* the questions.

ii) Each question carries *one* mark.

iii) Each question has *four* alternative choices. Choose the correct or the most appropriate one from among them and write down the alphabet indicating the response. $15 \times 1 = 15$

1. In an A.P, if $t_n = 7n - 3$, then the common difference is

a) 3 b) 4

c) 7 d) 10.

2. If $-33 \pmod 7 \equiv x$, then the value of x is

a) 2 b) 5

c) – 2 d) 4.

3. Total surface area of a sphere of radius 1 cm is

a) 4π cm^3 b) $4\pi r^2$ cm^2

c) 4π cm^2 d) $3\pi r^2$ cm^2.

4. $A - (B \cup C) =$

a) $(A - B) \cup (A - C)$ b) $(A - B) \cap (A - C)$

c) $(A - B) \cup C$ d) $(A - B) \cap C$.

5. $R = \{(-1, 1), (0, 0), (2, 4)\}$. The domain of R is

a) $\{-1, 0, 2\}$ b) $\{1, 0, 4\}$

c) $\{-1, 0, 4\}$ d) $\{1, 0, 2\}$.

6. G.C.D. of $3a^2b$ and $15ab^2$ is

a) $3ab$ b) $15a^2b^2$

c) $3a^2b^2$ d) $3ab^2$.

7. The term that has to be added to $x^2 + 16x$ to make it a perfect square is

a) 16 b) 64

c) 8 d) 36.

8. A point in $2x + y \leq 3$ is

a) (2, 2) b) (0, 2)

c) (3, 0) d) (0, 4).

9. Parallelogram inscribed in a circle is a

a) rectangle b) square

c) trapezium d) quadrilateral.

10. In ΔABC, $DE \parallel BC$, $AD = 3$ cm, $DB = 5$ cm, $AE = 6$ cm, then EC is

a) 10 cm b) 8 cm

c) 2 cm d) 3·6 cm.

11. The midpoint of the line segment joining the points (1, – 3) and (– 5, 7) is

a) (– 3, – 5) b) (– 2, 2)

c) (3, 5) d)

12. Area of a triangle whose vertices are (0, 0), (2, 0) and (0, 2) is

a) 1 sq. unit b) $\frac{1}{2}$ sq. unit

c) 2 sq. units d) 0 sq. unit.

13. $1 - \tan^2 45^\circ =$

a) 1 b) 0

c) $\frac{2}{3}$ d) 2.

14. Standard deviation of the data 5, 10, 15, 20, 25 is $5\sqrt{2}$. If we add 3 to each item, then the new standard deviation is

a) $3 + 5\sqrt{2}$ b) $8\sqrt{2}$

c) $5\sqrt{2}$ d) $2\sqrt{2}$.

15. A die is rolled once. The probability of getting a prime number is

a) $\frac{1}{3}$ b) $\frac{1}{2}$

c) $\frac{2}{3}$ d) $\frac{1}{6}$.

PART – B

(Marks : 20)

Note : i) Answer any *ten* from the *fifteen* questions.

ii) Show all the steps.

iii) Each question carries *two* marks. $10 \times 2 = 20$

16. Find the sum of the first eight terms of the G.P. 2, 4, 8, ...

18. A cylindrical pillar is 3·5 m in diameter and 20 m high. Find the cost of paintir its curved surface at the rate of Rs. 20 per square metre.

19. If $A = \{ a, b, c, d, e, f, g, h \}$, $B = \{ a, b, e, f \}$ and $C = \{ a, c, e, g, h \}$ fin $A - (B \cup C)$.

20. Given $A = \{ 1, 2, 3, 4, 5 \}$, $B = \{ 3, 6, 8 \}$. List the elements for the followin relations from A to B

(i) is less than

(ii) is greater than.

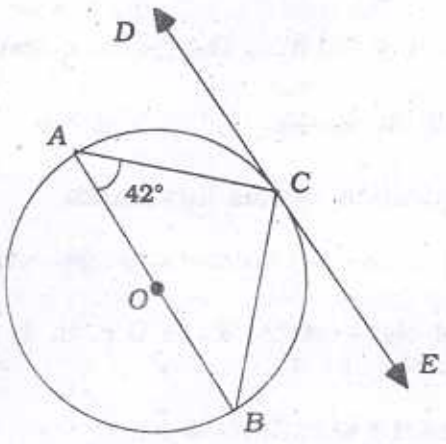
21. When $x + 2$ divides $4x^3 + 5x^2 + px - 2$ without remainder, find p.

22. Determine the nature of the roots of the equation $x^2 - 2x + 5 = 0$.

23. Define critical path and project duration.

24. How far is a chord of length 12 cm away from the centre of a circle of radiu 10 cm ?

25. In the figure, AB is the diameter of a circle. $\angle BAC = 42^\circ$, find $\angle ACD$.



26. Find the point which divides the line segment joining the points (– 1, 2) and (4, – 5) internally in the ratio 2 : 3.

27. If the straight line $7x - 5y = k$ passes through the point (1, 1), what is k ?

28. Use trigonometric tables, to find the value of $\sin 60^\circ 42' + \cos 42^\circ 20'$.

29. The least score of a cricket player of the school team is 5 runs in a series of ten matches. If his range of scores is 87, find his highest score in the series.

30. If three coins are tossed, then what is the chance of getting exactly one head ?

PART – C

(Marks : 45)

Note : i) This Part contains *ten* questions each with *two* alternatives. Answer any *nine* questions.

ii) Choose either of the alternatives in each question.

iii) Steps and diagrams should be shown.

iv) Each question carries *five* marks. $9 \times 5 = 45$

31. Find the sum of all multiples of 9 between 400 and 600.

OR

A rubber ball dropped from a height of 50 m rebounds at every impact from the floor to a height half of that from which it has fallen. Find the total distance described, by the time it comes to rest.

32. An ice-cream cone has a hemispherical top. If the height of the cone is 9 cm and base radius is 3 cm, find the volume of the ice-cream in the ice-cream cone.

OR

Three solid spheres of radii 6 cm, 8 cm and 10 cm respectively are melted to form a single solid sphere. Find the radius of the resulting sphere.

33. Verify the de Morgan's law $A - (B \cap C) = (A - B) \cup (A - C)$ using Venn Diagram.

OR

If $A = \{1, 2, 3, 4\}$ and $B = \{9, 13, 17, 21\}$ and if function $A \to B$ is defined by $f(x) = 4x + 5$, represent f as (i) set of ordered pairs (ii) an arrow diagram (iii) a graph (iv) a table.

34. In ΔABC, $m\angle C$ is 20° greater than $m\angle A$. The sum of $m\angle A$ and $m\angle C$ is twice $m\angle B$. Find the three angles.

OR

Factorise : $x^3 + 13x^2 + 32x + 20$.

35. Find the values of a and b if $25x^4 - 40x^3 - 34x^2 + ax + b$ is a perfect square.

OR

If α and β are the roots of $x^2 + 8x - 12 = 0$, find

(i) $\frac{1}{\alpha} + \frac{1}{\beta}$

(ii) $\alpha - \beta$

(iii) $\alpha^2 + \beta^2$.

36. Maximise : $Z = 30x + 20y$

subject to : $2x + y \leq 800$,

$x + 2y \leq 1000$,

$x \geq 0,\ y \geq 0$.

A small maintenance project consists of the following jobs whose activities and duration are given below :

Activity	1 – 2	1 – 3	2 – 3	2 – 4	3 – 4	3 – 5	4 – 5
Duration in days	20	25	10	12	5	8	10

(i) Draw the network diagram

(ii) Find the critical path and project duration.

37. Prove the converse of, "The perpendicular drawn from the centre of a circle to a chord bisects the chord."

OR

P and Q are the points on the sides CA and CB respectively of a ΔABC right angled at C. Prove that $AQ^2 + BP^2 = AB^2 + PQ^2$.

38. Show that (9, 0), (1, 4) and (11, – 1) are collinear.

OR

Find the equation of the perpendicular-bisector of the line joining the points A (1, 7) and B (– 3, 3).

39. If $\sin\theta = \cos\theta$ where θ is an acute angle, find the value of

$$\frac{2}{3}\tan^2\theta - \sin^2\theta - 7.$$

OR

The angles of depression of the top and the bottom of a 12 m tall building from the top of a tower are 45° and 60° respectively. Find the height of the tower.

40. The marks obtained by 10 students in a class test out of 100 marks are 62, 49, 71, 75, 33, 41, 100, 88, 50, 31. Calculate the standard deviation of the marks.

OR

Two dice are rolled once. Find the probability of getting an even number on the

PART – D

(Marks : 20)

Note : i) This part contains *two* questions, each with alternatives.

ii) Answer both the questions choosing either of the alternatives under each question.

iii) Each question carries *ten* marks. $2 \times 10 = 20$

41. Construct a triangle ABC such that $BC = 7$ cm, $m\angle A = 60^\circ$ and altitude from A to BC is 4·5 cm.

OR

Take a point P at a distance of 7 cm from the centre of a circle of radius 3 cm and from P draw two tangents PA and PB to the circle. Verify the lengths of the tangents by algebraic calculation.

42. Draw the graph of $y = 2x^2 + x - 6$ and hence find the roots of $2x^2 + x - 10 = 0$.

OR

Draw the graph of $xy = 12$, $x, y > 0$. Use the graph to find y when $x = 5$ and x when $y = 8$.