

[Taking at least one from each group answer any four questions. Each question carries 10 marks.]

Section A : Algebra

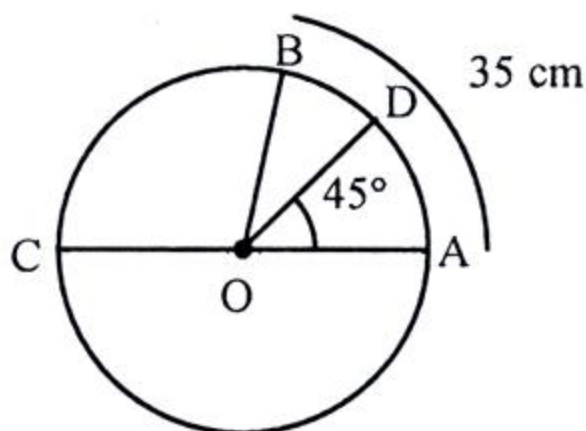
1. ► $P(x) = 4x^3 - 7x^2 + 5x - 2$ and $g(x) = x^3 + 4x^2 + x - 6$ are two binomial (d)
- Determine $g(1)$ 2
 - Find the factors of $g(x)$ 4
 - Show that $(x - 1)$, is a common product of $P(x)$ and $g(x)$ 4
2. ► $(1 - 4x)^4$, $(1 + x)^5$ and $\left(2x^2 - \frac{1}{2x}\right)^8$ are three algebraic expressions.
- Expand the first expression using pascals third law 2
 - Expand the third expression using binomial theorem and find the co-efficient of x . 4
 - Assuming the value of x is extremely less and avoiding the value of x^3 and higher order of x . prove that, the product of first and second expression is equal to $1 - 11x + 26x^2$ 4

Section B : Geometry, Coordinate Geometry, Solid Geometry and Vector

3. ► Depending on the theorem of Pythagorus prove a very important theorem of Apollonius which is known as a Theorem of Apollonius
- Describe the theorem of Apollonius with figure and express in equation 2
 - Prove the theorem. 4
 - Prove that three times of the sum of the square drawn on three side of a triangle is equal to four times of the sum of the square drawn on the three medians. 4
4. ► In a graph paper there are five points $(2, 3)$, $(5, 1)$, $(7, 4)$, $(6, 6)$ and $(3, 6)$. There is a prism drawn on the pentagon drawn with these five points which has a height of 3.6 unit.
- Draw the pentagon by putting the points in a graph paper 2
 - Find the area of the pentagon 4
 - Find the total surface area and volume of the pentagon. 4

Section C : Trigonometry and Probability

5. ►



In the figure ABC is a circular wheel, diameter of the wheel, $AC = 70$ cm

- a. If the length of AB arc is 35 cm, What is the value of $\angle AOB$? 2
- b. In the fig $\angle AOD = 45^\circ$, What is the length of Arc AD? 4
- c. If the wheel rotates 7 times per second, What will be the velocity per kilometer hour? 4

6. ► The probability of a person going to Khulna from Dhaka by train is $\frac{4}{9}$, probability of going by bus is $\frac{2}{7}$ and probability of going by plane is $\frac{2}{9}$. The probability of that person going to

Rangpur from Khulna by bus is $\frac{3}{5}$ and by train is $\frac{2}{7}$

- a. What is random test? 2
- b. Draw a probability tree for probable events 4
- c. Using the probability tree, Find out the probability of the person going to Khulna by train and Rangpur by bus. 4

- | | |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. a. 0;
b. $(x-1)(x+2)(x+3)$</p> <p>2. a. $1 - 16x + 96x^2 - 256x^3 + 256x^4$;
b. -14</p> | <p>4. b. 16.5 Sqr unit c. 89.14 Sq unit 59.4 cubic unit</p> <p>5. a. 1 radian b. 27.49 cm c. 55.42 km h⁻¹</p> <p>6. c. $\frac{4}{15} \cdot \frac{1}{3}$</p> |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Multiple Choice Questions

Time — 35 Minute Full Marks— 35

Subject Code :

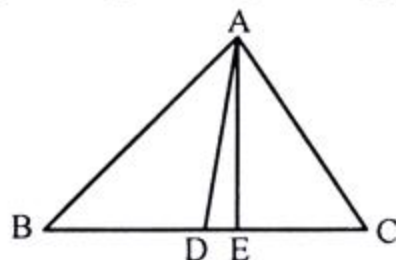
1	2	6
---	---	---

[Find out the best/correct answer and fill the circles with ballpoint pen. Each question is worth 1 mark.]

1. If $4^x = 16$ then $x = ?$
 (a) 2 (b) 4
 (c) 8 (d) 16
2. $F(x) = 3x + 1, 0 \leq x \leq 2$ then what will be the range of the function?
 (a) $[0, 2]$ (b) $[1, 7]$
 (c) $]0, 2[$ (d) $[0, 2[$
3. If $f(x) = \frac{3}{x-1}, x \neq 1$ then what is the value of $f^{-1}(3)$?
 (a) 2 (b) 3
 (c) 5 (d) 6
4. $f(x) = x + 5$ and $g(x) = x - 5$, what is the value of $(g(x))?$
 (a) $2x$ (b) x
 (c) 10 (d) 0.
5. What will be the remainder if we divide $p(x) = 36x^2 - 8x + 5$ by $(x - 1)$?
 (a) 49 (b) 41
 (c) 33 (d) 23
6. Which one will be found if we factorize $(a - b)^3 + (b - c)^3 + (c - a)^3$
 (a) $(a - b)(b - c)(c - a)$
 (b) $2(a - b)(b - c)(c - a)$
 (c) $3(a - b)(b - c)(c - a)$
 (d) $-3(a - b)(b - c)(c - a)$
7. Which one is irrational fraction?
 (a) $\frac{x^3 + 2x^2 + 1}{x^2 + 2x - 3}$ (b) $\frac{5x + 2}{x(x + 1)}$
 (c) $\frac{x^2 + 1}{(x + 1)(x + 2)(x + 3)}$
 (d) $\frac{x}{x^2 + 1}$
8. In any right angled triangle, the twice sum are of the square drawn on the three median. Will be how many times the area of the square drawn on hypotenuse?

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

9.



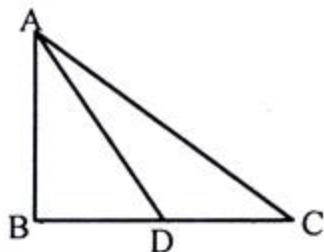
According to the fig.

- i. $AB^2 + AC^2 = 2(BD^2 + AD^2)$.
- ii. $AB^2 + AC^2 = 2CD^2 + 2AD^2$.
- iii. $AB^2 + AC^2 = 2AE^2 + 2DE^2$.

Which one is correct?

- (a) i & ii (b) i & iii
 (c) ii & iii (d) i, ii & iii

10.



Which one is the orthogonal projection of AD on BC?

- (a) AB (b) AC
 (c) BD (d) CD

11. From an outer point, how many lines can be drawn which will touch the circle?
 (a) 1 (b) 2 (c) 3 (d) 4
12. In a binomial equation $ax^2 + bx + c$ where $b^2 - 4ac > 0$ but it's not full square, how will the two roots be?
 (a) Real, unequal, rational
 (b) Unreal
 (c) Real, unequal and irrational
 (d) Real and equal

13. If $\sqrt{11x-6} = \sqrt{x-1}$, find the solution of the equation.

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

According to the information below, answer question 14, 15

$$xy - x^2 = 1, y^2 - xy = 2$$

14. Which one is the value of $x^2 - y^2$ according to the above equations

- (a) -3 (b) 3 (c) 4 (d) 6

15. Which one is the value of $(x - y)^2$?

- (a) -1 (b) 1
(c) $\sqrt{3}$ (d) 3

From the given information below answer ques : 16-18

$8 + 2 + \frac{1}{2} + \frac{1}{8} + \dots$ is a geometric progression

16. What is the common ratio of the progression?

- (a) 4 (b) 2 (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

17. Which one below is the 5th term of the progression?

- (a) $\frac{1}{16}$ (b) $\frac{1}{24}$
(c) $\frac{1}{32}$ (d) $\frac{1}{48}$

18. What is the infinite sum of the progression?

- (a) 6 (b) 8
(c) $\frac{33}{4}$ (d) $\frac{32}{3}$

19. If $\sin A = \frac{b}{a}$, what will be the value of $\tan A$?

- (a) $\frac{b}{\sqrt{a^2 - b^2}}$ (b) $\frac{a}{\sqrt{a^2 - b^2}}$

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

20. What will be the angular difference between the hour hand of a clock and the minute hand of a clock at 9 : 30 am

- (a) 90 (b) 100
(c) 105 (d) 110

21. What is the angle produced at a centre if an arc having equal length of the diameter subtends the angle?

- (a) One radian angle
(b) One right angle
(c) One straight angle
(d) One solid angle

22. If, $a > b$ and $c < 0$, which one is correct below?

- (a) $ac > bc$ (b) $\frac{a}{c} > \frac{b}{c}$
(c) $ac < bc$ (d) $\frac{c}{a} < \frac{c}{b}$

23. $\log_2 5 + \log_2 7 + \log_2 3 = ?$

- (a) $\log_2 105$ (b) $\log_2 150$
(c) $\log_{105} 2$ (d) 0

24. If $3(27)^x = 9^{x+4}$, what is the value of x?

- (a) -9 (b) 3
(c) 4 (d) 7

25. i. $\sqrt[3]{1+x} - 2^{\frac{1}{3}} = -(1-x)^{\frac{1}{3}}$ the solution is $x = \pm 1$

ii. If $b^2 - 4ac = 0$, then the roots of $ax^2 + bx + c = 0$ will be real and unequal

iii. $a > 0$ but $a \neq 1$ and If, $x \in \mathbb{R}$ then $\log_a a^x = x$

Which one is correct?

- (a) i & ii (b) ii & iii
(c) i & iii (d) i, ii & iii

26. $(3x - \frac{1}{2x})^{10}$ in the expansion of this series what is position of the middle term?

- (a) 5 th (b) 6 th
(c) 7 th (d) 8 th

27. In the expansion of $(x + y)^n$ —

- i. General term $\binom{n}{r} x^{n-r} \cdot y^r$
ii. In the expansion of every term the sum of the power of x and y is equal to n.
iii. In the expansion, the number of terms = n + 1.

Which one is correct?

- (a) i & ii (b) i & iii
(c) ii & iii (d) i, ii & iii

28. What will be the value of y if the point is situated on x axis

- (a) 2 (b) y
(c) 10 (d) 0

29. What is the distance between (2, 2) and (-2, -2)?

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

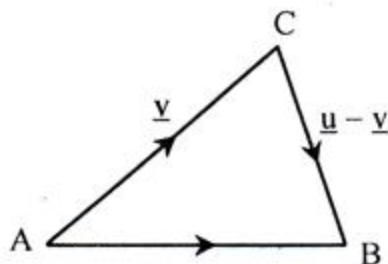
30. \vec{AB} is a directional line

- i. A vector
ii. length of it $|\vec{AB}|$
iii. The direction of the line is from B to A.

Which one is correct?

- (a) i & ii (b) i & iii
(c) i & iii (d) i, ii & iii

31.



If $\vec{CB} = \vec{u} - \vec{y}$ and $\vec{AC} = \vec{y}$ then $\vec{AB} = ?$

- (a) $\vec{u} + \vec{y}$ (b) \vec{y}
(c) \vec{u} (d) $\vec{u} - \vec{y}$

32. Any hexagonal prism has a height of 5 cm, and the arm is 4 cm, what will be the area of the side surface?

- (a) 9 (b) 20
(c) 80 (d) 120

33. AB and CD lines will be co-planar.

- i. If $AB \parallel CD$
ii. AB and CD intersects at D point
iii. There is no common point between AB and CD

Which one is correct?

- (a) i & ii (b) i & iii
(c) ii & iii (d) i, ii & iii

Ans. question nos. (34, 35) from the given information below :

There are 6 oranges, 11 apples and 17 mangoes in a basket. If we pick a fruit by random choice

34. What is the probability of the fruit to be apple?

- (a) $\frac{1}{36}$ (b) $\frac{1}{13}$
(c) $\frac{1}{6}$ (d) $\frac{13}{36}$

35. What is the probability of the fruit not being mango?

- (a) $\frac{19}{36}$ (b) $\frac{17}{36}$ (c) $\frac{13}{36}$ (d) $\frac{1}{6}$

Ans.

1	(c)	2	(b)	3	(a)	4	(b)	5	(c)	6	(c)	7	(a)	8	(c)	9	(a)	10	(c)	11	(b)	12	(a)	13	(d)	14	(a)	15	(b)	16	(d)	17	(c)	18	(d)	19	(a)	20	(c)		
21	(a)	22	(c)	23	(a)	24	(d)	25	(c)	26	(b)	27	(d)	28	(d)	29	(a)	30	(a)	31	(c)	32	(d)	33	(a)	34	(d)	35	(a)												